All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

www.3DArtistonline.com

3DArtist™

56

Practical inspiration for the 3D community

V-RAY RENDERS

Create stunning underwater scenes with Maya & ZBrush

CREATE THE COVER
STEP-BY-STEP TUTORIAL INSIDE

3DS MAX & MAYA

The definitive review of Autodesk 2014

THE ART OF CG WORLDS

How the craft of environment design has evolved

Method Studios

The VFX industry today and its impact on up-and-coming vendors

REALFLOW SIMULATIONS

RealFlow 2013 is put to the test in our review and expert tuition

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ISSUE 056
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Model by Simon Williamson
http://be.net/Row0

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The beautiful thing about 3D art is that it can take us anywhere. All it takes is a little imagination, as well as a lot of talent, and the best artists can transport us to ancient historical scenes; to starships humming through the edges of space; to monstrous creatures in worlds unknown.

That's what Iliya Atanasov has done below, plunging us into the depths of a mysterious ocean to witness a killer shark bursting through a shoal of fish in a glimmering underwater scene. You can follow Iliya's steps and re-create this image on page 52.

To see more work like this, be sure to check out Iliya's company, Pixelhunters, a top 3D animation studio headquartered in Dubai: **www.pixelhunters.com**.

Create this natural-born killer page 52

With the Disc

Free with this issue

- Tutorial screenshots to guide you through the project

> "I wanted to re-create a scary diving moment, when you are surrounded by a huge school of fish and a great white shark bursts through them"

Iliya Atanasov, studio director at Pixelhunters, reveals his workflow on **Page 52**

Artist info

Iliya Atanasov

Professional portfolio site
www.pixelhunters.com

Country UAE

Software used ZBrush, Maya, V-Ray, Digital Fusion

You can create this image from start to finish by following Iliya Atanasov's tutorial on page 52. Iliya has been creating virtual art like this since his early years. "Each piece of artwork has its own beauty," he says. "The feeling of accomplishment as you work through the process of creation is what I truly live for in my work!"

Welcome

to the magazine and 116 pages of amazing 3D

Every issue you can count on...

1. **Exclusively commissioned art**
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3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

Hello and welcome to 3D Artist magazine! As we're sure you've noticed, this issue features a rather ferocious cover, created by the talented Iliya Atanasov of Pixelhunters. Turn to page 52 for his top tips on underwater imagery.

Also in the issue, Benjamin Brosdau reveals his workflow for realistic glass (page 62), Gavin Goulden wraps up his Spacegirl series (page 70) and Paulo Wang explores RealFlow simulations (page 86). If you want to follow his steps, then check out the 90-day RealFlow trial free with the issue.

All of this, and I've barely scratched the surface of what issue 56 has to offer. So, turn the page and let's get cracking!

Chris

This issue's team of expert artists...

Gustavo Åhlén

In this next entry into Gustavo's anatomy series, we explore sculpting the arms and hands of the human skeleton

Jahirul Amin

Our Maya maven Jahirul gets stuck into Autodesk 2014, with a review project centred around the charming *NutJob*

Iliya Atanasov

Cover artist Iliya details the tips and techniques he uses for stunning underwater imagery. A must-read!

Orestis Bastounis

Our resident tech expert Orsetis looks at affordable workstations that you can build yourself on page 32

Timur 'Taron' Baysal

When it comes to Sculptris, Taron knows what's up. On page 82 he discusses the free software's Paint tools

Benjamin Brosdau

Benjamin's grasp on Maxwell Render is absolute, so we had him render a mythical greek bust in jade. Find more on page 62

Gavin Goulden

BioShock Infinite character artist Gavin wraps up his Spacegirl series, sending her off to find exciting adventures unknown!

Marcus Kenyon

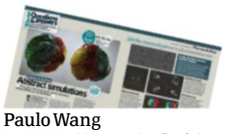
Finger Industries owner Marcus reveals why 3ds Max 2014 is a huge boost to his studio's pipeline, over on page 94

Jorge Lacera

This issue Jorge uses Gavin Goulden's Spacegirl asset to reveal how to make such projects stand out in your portfolio

Thomas Lishman

ZBrush is a tool with many uses, as Thomas showcases in this 3D concept sculpting tutorial. Some top tips here



Paulo Wang

Upon seeing Paulo's simulation work out in the wild, we had to get him on board for a tutorial. His RealFlow work is on page 86

Eduard Schulze-Battmann

Eduard also has the low-down on what RealFlow 2013 brings to budding simulation artists. Turn to page 96 for his review

Sign up, share your art and chat to other artists at www.3dartistonline.com

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The art of CG worlds

"Environment art is becoming bigger, more complex and more visually impressive"

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Free tutorial files available at:
www.3dartistonline.com/files

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Build affordable DIY workstations

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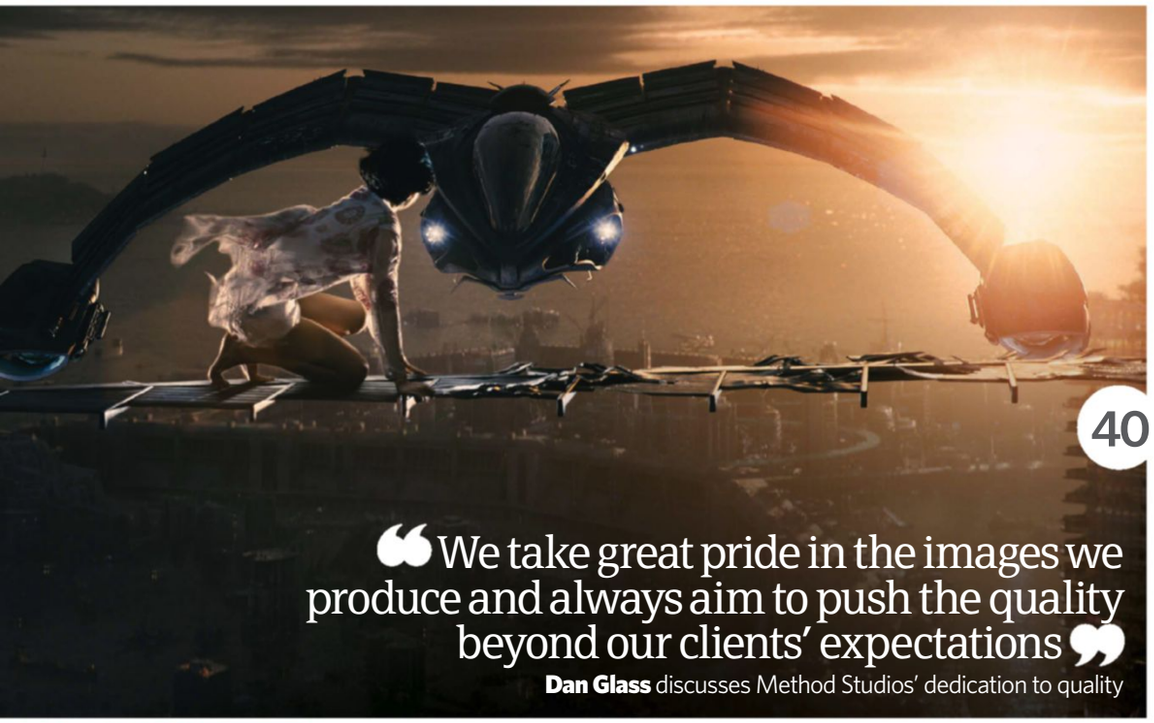

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"We take great pride in the images we produce and always aim to push the quality beyond our clients' expectations"

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Turn to page 112 for the complete list of the disc's contents

WELCOME TO

THE GALLERY

Seven pages of great artwork from the 3D community

Images we love!

3DArtist Loves

This is a catastrophic and violent image brought to electrifying life by some great effects work. Stunning stuff!

Chris Deputy Editor

Have an image you feel passionate about? Get your artwork featured in these pages

Create your gallery today at **www.3dartistonline.com**

Or get in touch... 3dartist@imagine-publishing.co.uk @3DArtist Facebook.com/3DArtistMagazine

> I wanted to create a dynamic environment. I decided not to worry about the laws of physics and simply make an action-packed image, with ships being broken apart by violent winds
>
> **Dmitriy Eremenkov,** *Cataclysm*, 2013

Artist info

Dmitriy Eremenkov

3DArtistonline

Username: wasteland

Personal portfolio site www.wasteland-3d.deviantart.com

Country Russia

Software used Vue, 3ds Max, Photoshop

Work in progress...

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3DArtist Loves

"This is a really striking character thanks to the bold lighting emanating from the right-hand side of the image"

Larissa Staff Writer

Artist info

Hosien Mohamadian

3DArtist online

Username: Hosienmax

Personal portfolio site www.facebook.com/hosien.max

Country Iran

Software used ZBrush, mental ray, 3ds Max

Work in progress...

"This image is based on a concept by my good friend Paria Esmaeeli. I really loved it, so was inspired to create this model"

Hosien Mohamadian, *Alien*, 2013

Artist info

Zhang Chen

Zhang is a 27-year-old student from China. He has been a 3D lecturer in Beijing for six years

Personal portfolio site
www.cg-zhang.cghub.com

Country China

Software used Maya, ZBrush, mental ray, Photoshop

Work in progress...

3DArtist Loves

"Not every abandoned city needs to be dark and grey. When coupled with expert modelling, bright and powerful colours can convey a sense of eeriness too"

Chris Deputy Editor

"This work took me one month to complete. I attempted to portray the desolation and loneliness of a city without the usual dark shades and tones. I adopted the bright sunlight of noon, which enables the rich colours to shine through"

Zhang Chen, *Seedy City*, 2011

Artist info

PIX™

Set Visions Imaging Studios

Set Visions produces photorealistic CGI under the exclusive brand PIX

Personal portfolio site www.setvisionspix.co.uk

Country UK

Software used 3ds Max, V-Ray, Photoshop

"This image was created in 3ds Max, then lit and rendered in V-Ray. It was then taken into Photoshop for basic post-production with combined vignette, flare effects and creative depth of field to add some atmosphere"

Set Visions Imaging Studios, *Photorealistic CGI*, 2013

3DArtist Loves

"This is an amazing example of photorealism – the reflections on the polished metal are really top-notch"

Chris Deputy Editor

> This started out as an exercise to learn and acquire new skills. With time new ideas came to mind and I completed this entire scene. I was very satisfied with the result
>
> **Herner Quintero,** *Mechanical Life,* 2013

Artist info

Herner Quintero

Herner is a graphic designer and 3D generalist interested in all CG methods and techniques

Personal portfolio site www.hernergrafico.blogspot.com

Country Colombia

Software used MODO, Mudbox, Photoshop

Work in progress...

3DArtist Loves

Ensuring that your characters have personality is key to capturing your audience's attention. This charming robot does that perfectly

Larissa Staff Writer

Artist info

Riyahd Cassiem

3DArtist online

Username: Riyahdc

Personal portfolio site
www.riyahdart.blogspot.com

Country South Africa

Software used ZBrush, Photoshop

Work in progress...

3DArtist Loves

"Riyahd continues to impress with his unique and distinctive robot designs. The detail on this drone really makes it stand out"

Chris Deputy Editor

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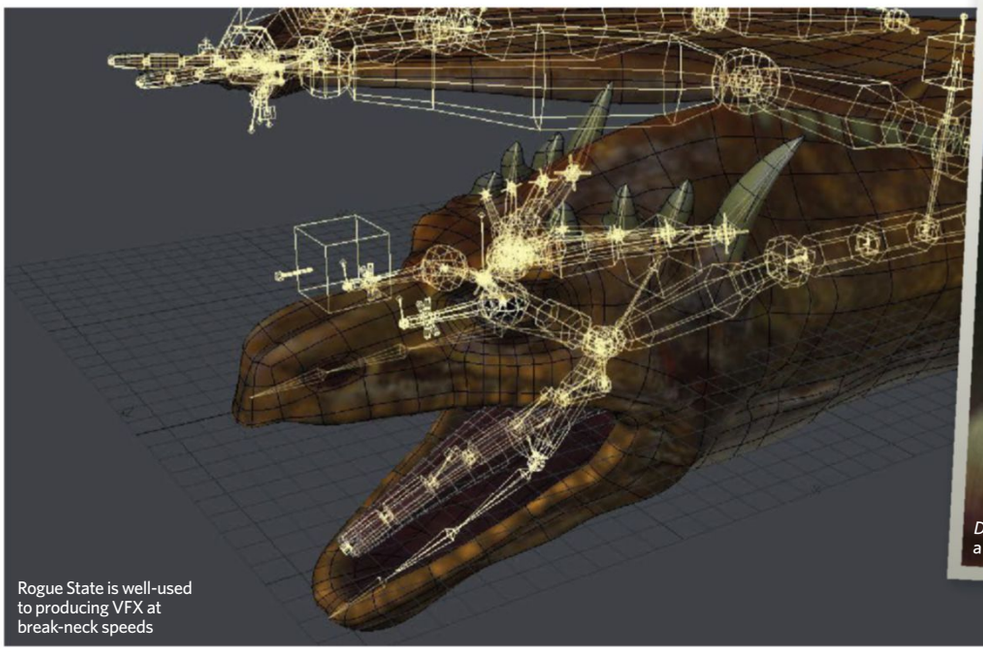
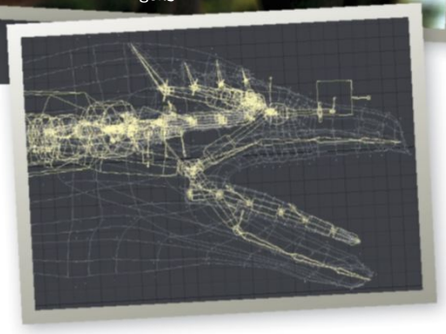

Rogue State is well-used to producing VFX at break-neck speeds

Dracano pits the US military against a swarm of ancient dragons



VFX against the clock

How Rogue State specialises in fast-turnaround low-budget FX movies

When a volcanic eruption in the Pacific north-west of the USA hatches a swarm of prehistoric dragons, the military is brought in to prevent a global apocalypse. It sounds like a fairly credible Hollywood movie plot, but one requiring a decent FX budget. In truth, *Dracano* is a low-budget direct-to-DVD feature, which FX company Rogue State (www.roguestateproductions.com) had to complete in a short six weeks.

"Since we are all used to TV delivery schedules, we have the mindset of working under tight deadlines," says Scott Wheeler, visual effects supervisor and company president. "Typically we try to keep the shot count under 100, but *Dracano* grew to over 200 by the end".

In addition to several different types of dragon, ranging from babies to a 200-foot adult super-dragon, the effects artists had to create exploding lava, steam and smoke. Without the budget to hire helicopters, jets and military vehicles for the film, the FX artists needed to create those too, as well as construct the battles between military and reptilian firepower.

Rogue State is no stranger to this kind of work, with titles such as *Sand Sharks*, *Mega Piranha*, and *Predator X* already under its belt. "In our segment of the market, creating visual effects for ultra-low or low-budget features, our visual effects team needs powerful, cost-effective 3D animation tools that get the job done quickly," said Scott Wheeler. "We have a core team that has done this many times, so it's just a matter of going over the shots we have planned and then the team breaks off and sub-divides the movie into manageable chunks. There is very little need to micro-manage or look over anyone's shoulders. We've become a fairly well-oiled machine."

LightWave's new rigging and soft body dynamics tools enabled realistic creatures to be developed

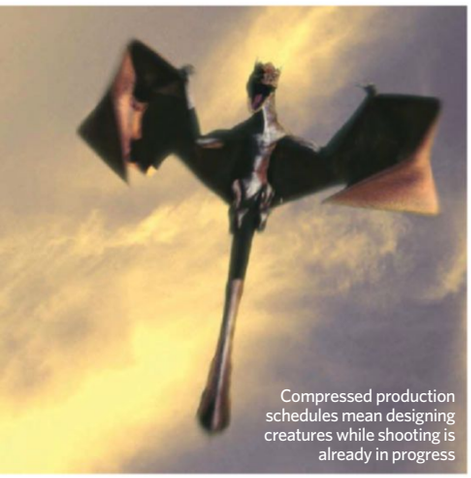
> "There is very little need to micro-manage or look over anyone's shoulders. We've become a fairly well-oiled machine"
> **Scott Wheeler, VFX supervisor and president of Rogue State**

FX tools

Rogue State makes heavy use of LightWave, citing version 11.5's new automatic rigging system, Genoma, and the software's Bullet Dynamics as two of its most valuable tools in getting the project done on time.

"Bullet knows which surfaces to deform based on Weight maps and other parameters you set," Wheeler explains. These maps enable artists to create moving flesh just where they need it.

It was in combining very quick rigging tools with controllable secondary animation that Rogue State was able to smoothly work through the volume of shots in the film.

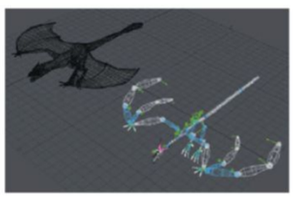

Compressed production schedules mean designing creatures while shooting is already in progress

Pre-vis and design

How Rogue State tackles the various production stages

When working against the clock, Rogue State doesn't get the luxury of a full pre-production stage. "99 per cent of the time the design process takes place while we are filming," says Wheeler. "This isn't the most efficient way of going about it, but it's the reality of smaller-budget movies. This means we have to be able to think on our feet during production.

"For a movie like *Dracano*, we'll take a bunch of designs we have done for other movies and show them to the director," Wheeler continues. "In a perfect world we can mix and match elements to create a new dragon, but we encourage directors to bring other references that we can incorporate. Because of budget constraints, we may not be able to match something exactly from a larger movie, but we will try to get in as much as we can."


Wheeler explains that the studio is often able to reuse designs and model elements from previous projects

Simple sculpting tips

Creating great characters means starting simple, according to Mat Makin

Mat Makin www.matmakin.com

Mat Makin produces characters for the videogame industry. In the past he's worked on *Star Trek*, *Warframe* and *The Darkness II*, and he always strives to bring his own look to his work without compromising on style.

"When starting something new, I like to look for artwork that inspires me. I then gather reference materials for what I intend to make – that is always crucial," he explains.

"Usually I'll start with a really primitive base mesh, literally a box or sphere, or something that resembles the shape of a person with an even polygon density," he continues. "I then just push, pull and sculpt away in ZBrush until it resembles what I had intended it to."

Being able to refine and edit the simplest of meshes is the key. "DynaMesh within ZBrush was a great enhancement – the ability to make geometry on the fly is so handy, especially when you want to get some concept ideas out of your head and into 3D."

Sculpting from a simple primitive enables Matkin to experiment © Warframe®

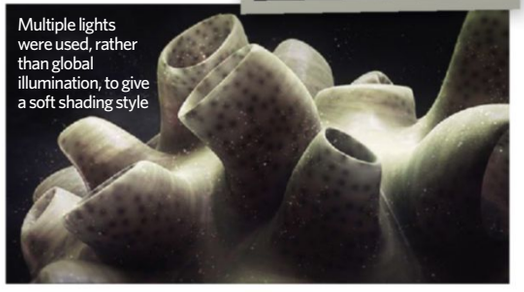
Once the sculpting is done, Matkin prefers to switch to 3ds Max to create UVs. He then uses xNormal for baking textures and Photoshop to edit them. *Warframe* is now available to play for free at www.warframe.com.

Textures are baked using xNormal, **resulting in a detailed final model**
© Warframe®, now available on PC and Steam. Play the game for Free at **www.warframe.com**

Using organic animation to create a unique sci-fi short

"To re-create the underwater movements I used tools such as cloth simulation, particle systems, jiggle deformers and Soft Body Dynamics in CINEMA 4D. Most of the time I had to mix two or more techniques to achieve a more realistic organic movement."

Organic shapes were animated using soft body dynamics and particle systems


Multiple lights were used, rather than global illumination, to give a soft shading style

Amorphous design

Building hypnotic sci-fi creations

Jordi Pagès www.jordipages.com

When artist Jordi Pagès was commissioned to provide the main titles for the Sci-fi London Film Festival, the brief was simple: 'Sci-fi is born here'.

Pagès chose to interpret this brief as a series of organic animations that represented strange living shapes and evolving movement. "I wanted to visualise the festival represented as an alien cocoon; a container for all the new talent and productions that were about to be released during the festival," he explains.

"I've always enjoyed underwater documentaries and photographs. I love how undersea creatures have hypnotic movements produced by the flow of water, giving them a magic feeling of weightlessness, so I started to explore how to get that hypnotic movement on my 3D models.

"For the rendering I was keen to get away from the general GI-render look that a lot of 3D work has, so instead of using GI I applied a lot of lights on my scene, in some shots more than 50, aiming to control every little highlight, shadow and tone," he concludes.

A galaxy of inspiration for 3D artists in just one app

Brain Dump condenses an encyclopedia's worth of facts into simple digestible articles

Want to learn the secrets of life, the universe and more? Brain Dump, Imagine Publishing's new digital-only science magazine, has you covered.

Brain Dump delivers a flurry of fascinating facts every issue, reducing tough-to-grasp concepts about science, nature, technology and more into bite-sized easy-to-learn articles. Whether it's the rings of Saturn, how sharks hunt, or the intricacies of string theory, Brain Dump condenses even the most difficult subject matter into clear and understandable chunks.

For 3D artists on the go, it's absolutely packed with inspiration. Flick through an issue and you'll be taken on a journey that encompasses everything from the delicate tendrils of a neuron to the swirling arms of a far-flung galaxy. Brain Dump is positively packed with ideas and inspiration that are sure to influence any imaginative artist's 3D projects.

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Brain Dump is an exciting and dynamic new app for any 3D artist looking to absorb knowledge while searching for inspiration

FMX 2013

The FMX digital effects, animation and post-production conference sees huge success

289 speakers offered presentations to over 3,000 visitors this year. Highlights included keynotes by Pixar director Saschka Unseld and Ed Ulbrich, CEO of Digital Domain.

Top of the agenda this year was the state of the Hollywood FX industry, as financial pressure combines with increasing demands from filmmakers to produce greater and more intense effects scenes, with increasingly less cash. Calls for a global trade association to define best practises were well received and look set to gain traction – at least among artists.

Games also featured strongly this year, including *Crysis 3*, *Tomb Raider* and *Gears of War*, as well as indie games such as *Helvetia*. There were also talks on crowd-funding and motion control, and discussions stretching from the creative side of game development, such as world-building, to the more serious social and political themes many titles are now attempting to incorporate into their stories and gameplay.

FMX 2013 was well attended
Photograph: Reiner Pfisterer

Mech Something Awesome

£1,110 WORTH OF PRIZES TO BE WON
with Adhesive Games, Meteor Entertainment and Wacom

3D Artist, Wacom, Adhesive Games and Meteor Entertainment have teamed up to offer 3D Artist readers a chance to showcase their skills and win a truly exciting selection of prizes!

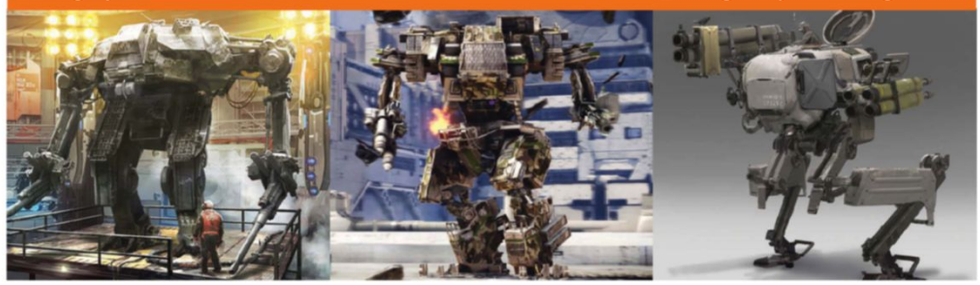
For our Mech Something Awesome competition, we're asking readers of the mag and fans of free-to-play FPS *HAWKEN* (www.playhawken.com) to create a digital design of a combat mech using 3D software. Entrants are tasked with making their own interpretation of what a futuristic *HAWKEN*-esque combat mech should look like, with a shortlist of entrants being highlighted on the 3D Artist Facebook and Twitter. These designs will be put to a vote on 23 August and those with the highest number of votes will go on to win a selection of high-quality Wacom products (www.wacom.eu) and *HAWKEN* graphic novels.

Our two lucky winners will each receive a Wacom Intuos5 touch L worth £429.99 each. The three winners of our second prize will each receive a Wacom Inkling Digital Sketch Pen worth £84.95, while ten lucky runners up will each receive a copy of the new *HAWKEN* graphic novel.

So, what are you waiting for? Get designing your own 3D combat mechs for *HAWKEN* and send in your entries to 3dartist@imagine-publishing.co.uk

You can register for a free *HAWKEN* account at www.playhawken.com. For more information on Wacom products and the Intuos5 Touch L check out www.wacom.eu.

Design your own 3D combat mech and send it to 3dartist@imagine-publishing.co.uk



Wacom Intuos5 touch L

Wacom's redefined Intuos5 tablet is created bespoke for designers and artists who wish to take their digital content-creation to the next level. Enhanced features include multi-touch gesture support for intuitive input, an Express View display to facilitate an efficient workflow and wireless capabilities for convenience. Head over to **www.wacom.eu**, or watch the product video at **www.tinyurl.com/3DAIntuos5**.

Wacom Inkling Digital Sketch Pen

The Inkling is Wacom's Digital Sketch Pen, which captures a digital likeness of a user's work while they sketch on traditional paper. Designed for rough concepting and creative brainstorming, the device gives illustrators and graphic designers a unique way to rough-out ideas with real ink on paper, while capturing their concepts digitally so they can later be refined. You can find out more at **www.tinyurl.com/3DAInkling**.

What is HAWKEN?

HAWKEN is a free-to-play, multiplayer, first-person mech shooter, developed by Adhesive Games and published by Meteor Entertainment. It's one of the finest-looking games around right now, delivering an intense and enjoyable battle experience. The game captures the feeling of piloting a heavy war machine, while keeping the action fast-paced and strategic. You can check out the trailer (and get some inspiration) here: **www.tinyurl.com/3DAHawkenTrailer**. Better yet, head over to **www.playhawken.com** to play the game for free!

ADHESIVE GAMES

wacom

meteor ENTERTAINMENT

TERMS AND CONDITIONS: Imagine Publishing and its partners have the right to substitute the prize for a similar item of equal or higher value. Employees of Imagine Publishing, Adhesive Games, Meteor Entertainment, Wacom, their relatives or any agents are not eligible to enter. The editor's decision is final and no correspondence will be entered into. Prizes cannot be exchanged for cash. From time to time, Imagine Publishing or its agents may send you related material or special offers. If you do not want to receive this, please state so clearly in your competition entry. All entrants agree to participate in any promotion related to this competition. The competition closes on 16 August 2013.

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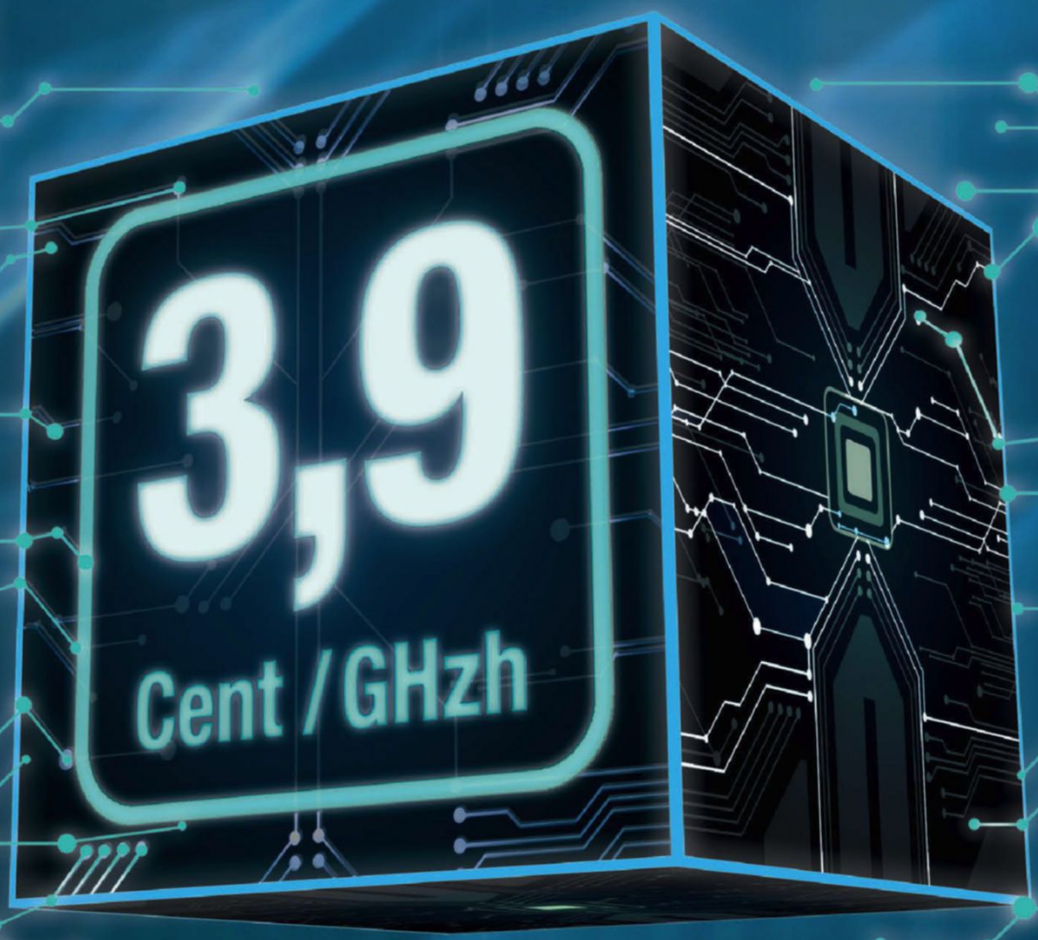

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A

Images of the month

Check out the top illustrations submitted to 3DArtistOnline.com over the last month

Share your art
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3DArtist online .com
www.3dartistonline.com
to view the art and chat to the artists

A Breakfast

» **Matthieu Garnier**

3DA username garnier mattyeu

Mattheiu says: "In this simple scene I attempted to re-create realistic food. All models were created inside Maya and textured in MARI. I then used After Effects for post-production."

We say: *Sometimes even the simplest of images can have a massive impact. The amazing texture work and clean solid shapes in this image really make it stand out as something special. It's so realistic, we almost feel as though we can reach out and dig in!*

B HMS Victory Under Full Sail

» **Guerin Dean Raught**

3DA username graught

Guerin says: "I have always loved this ship and I finally found time to create an image entirely for myself. The model was by Dreamscape-Creations at DAZ 3D. It was rendered in Vue 11 and touched up in Photoshop."

We say: *This is a straightforward but effective piece of modelling work. The sails of this epic ship produce a tremendous sense of scale, while the Vue render evokes a tangibly emotive atmosphere.*

C Toothfairy

» **Nuttavut Baiphowongse**

3DA username Gibbon

Nuttavut says: "Nothing could be more fun that making this monster! I worked on it for a ZBrush class demonstration."

We say: *This is a fantastic piece of work reminiscent of the work of Guillermo del Toro. It's still packed with plenty of imagination to call its own, though! The lighting in particular is well placed to complement this character.*

D Female Cleric

» **Arno Schmitz**

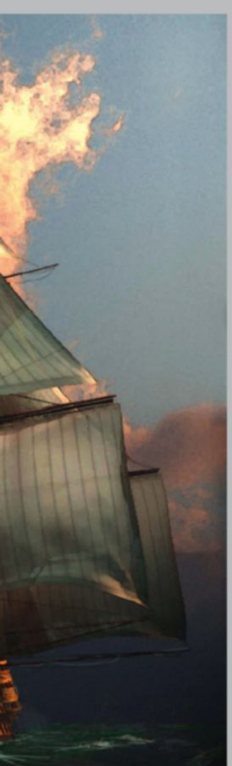
3DA username Arno

Arno says: "This was the first image I completed after graduating visual art for games. I only recently completed it though, applying many lessons I learned from the classical arts. This made a significant impact on the look of the final model."

We say: *You can tell that Arno has had training in the classical arts. The pose of this character is both delicate and purposeful – a difficult balance to achieve!*

B

Image of the month



Monkey Island Pirate

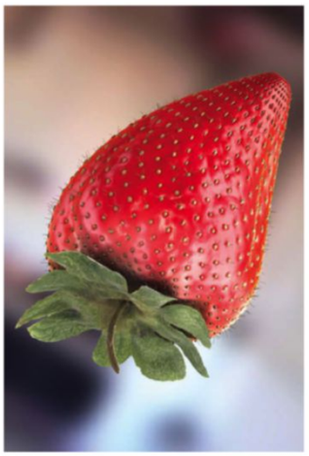
» **Cleyton Jonnas da Silva**
3DA username Cleyton
Cleyton says: "I made this character for modelling practise and then I decided to start texturing and shading it. The character is based on a concept by Carlos Huante."
We say: *If you're going to create a pirate, then he needs to look wrinkly, old and dishevelled. Thanks to some excellent texturing work Cleyton has achieved the effect brilliantly.*

Gas Gun Boss

» **Kieran McKay**
3DA username Keyz78
Kieran says: "This is a tribute to Clément Sauvé, inspired and created from one of his character designs called *Gas Gun Boss*. The artwork was created in 3ds Max and ZBrush."
We say: *This is a solid and a well-realised sculpt. We could imagine running past this character during a game of Team Fortress 2.*

Statue of Perseus & Medusa

» **David Vidal**
3DA username latino1990
David says: "This image was created for my university project, in which we visited the V&A Museum in London and chose a sculpture to model within ZBrush."
We say: *Sculpting a classical sculpture is no easy task, considering the detail that goes into them. David has made a commendable effort here though, with a nice bronzed finish for extra effect.*



Strawberry

» **Abderrahmane Boudermine**
3DA username POPA_3D
Abderrahmane says: "I created this strawberry model using 3ds Max and mental ray, because I like strawberries and, being a 3D model-seller on Turbosquid, I wanted to create a truly competitive product. You can purchase the model at **www.tinyurl.com/TurbosquidStrawberry**."
We say: *This is a fantastic piece of work, right down to the small hairs that protrude from the strawberry's surface. It's bordering on a very impressive level of photorealism.*

Have your say

Email, Tweet or get in touch with us on Facebook to share your thoughts, opinions and proudest projects

Top tweets

Get involved... @3DArtist

@BrassEngineMatt Got my mitts on the new @3DArtist and will be enjoying it with a delicious beer this merry eve. Well done Friday.

@geckoanimation Check out @3DArtist's latest issue featuring a cover designed by our own Ben Simonds! (and more within!)

@stroggtank Wow, that's an awesome cover! : O

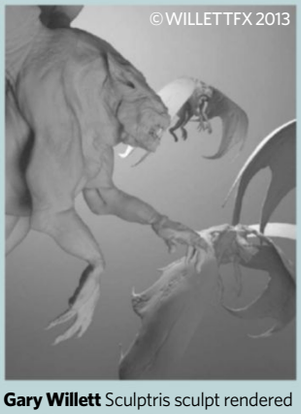
@SuperNerdMe @3DArtist has the best customer service. Mailed about a bad disc, got a reply only mins later and they're sending a replacement disc. AWESOME!

You tell us

Have you seen Disney Research's new compositing system, DuctTake? www.youtu.be/7eAo9cDgNLg

Facebook.com/3DArtistMagazine

Emer Murphy Anybody else singing DuctTake to the tune of *Duck Tales* (wee-oo)?



Gary Willett Sculptris sculpt rendered with Blender 2.67. Couldn't sleep, been up since 2:00am, so rendered this. I enjoy sculpting with Sculptris... although I do miss sculpting in clay.

Star letter

digital-tutors

www.digital-tutors.com is a learning resource site boasting a library of 20,000 video-based CG lessons

THE AUTHOR OF THIS ISSUE'S STAR LETTER WINS A MONTH'S FREE SUBSCRIPTION TO DIGITAL-TUTORS WORTH $45

Visually affecting

Hello 3D Artist! I must say, I'm quite concerned at the moment with the state of the VFX industry. It's been a long-time dream of mine to work at one of the top VFX vendors, but the recent situation with Rhythm & Hues and the issues surrounding Digital Domain in months past have got me thinking. Are my dreams of the high-flying lifestyle of a superstar CG artist really just that – dreams – and in reality I'll find myself overworked and underpaid with little to no job security? I've worked hard to get where I am – many years of education, in fact – and I don't want it to all be for nothing! Thanks and keep up the good work!

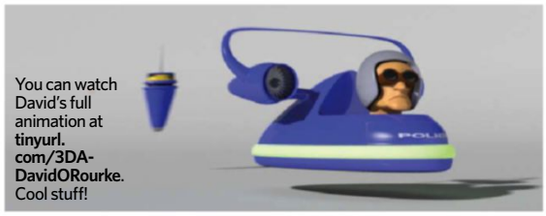
Craig, via email

Thanks for your message, Craig! There is a worrying trend developing in the VFX industry of large global vendors suffering financial troubles due to the competitive nature of the business, but now that a spotlight has been shone on the situation things should hopefully start to improve.

It's also important to remember that while the bigger and less manoeuvrable studios are suffering from these issues, small-to-medium sized studios aren't experiencing the same financial difficulties. In fact some are flourishing thanks to their ability to keep things small and manageable.

So, there are always going to be opportunities for any talented artists to make a name for themselves. The key thing is to keep working hard, keep improving your skills and always seek out opportunities wherever you can find them. You'll get there if you want it enough!

Although the VFX industry has recently entered a period of dire straits, it's important to remember that it's still one of the biggest industries in the world. It's not disappearing any time soon



You can watch David's full animation at **tinyurl.com/3DA-DavidORourke**. Cool stuff!

A newbie

Hi 3D Artist. I've tried to master MODO, ZBrush and Maya but have given up many times. However, one day I came across an old tutorial by the brilliant Andy Brown of Luxology, featuring the design and animation of a cartoon policeman and his hovercar. Over the next three weeks I followed the instructions and completed my first animation – my mind has been blown ever since!

On another note, I would like to ask if you could include a glossary of terms for newbies. This would help me a lot as I sometimes come across technical terms I don't understand.

Many thanks for a brilliant magazine!

David O'Rourke, via email

Hi David, thanks for sending your animation over, great stuff! The glossary sounds like a brilliant idea, so keep your eyes peeled.

Blender predictions

Hello! I would just like to say I really loved issue 55's Blender special. I'm a huge fan of both the software and the company and what it's trying to achieve. I've been wondering, in five or ten years, could Blender really be the biggest software out there? It's improving all the time and at a price point of $0 stands up quite well next to the thousands of dollars other companies ask for to use their tools. Are we looking at an open-source revolution?

Thanks,

Lucy, via email

Blender is an exciting software for anyone out there new to 3D. That's why we dedicated 25 pages to it in issue 55

Thanks for getting in touch! Blender is a seriously exciting software right now – that's why we dedicated an issue to it. It's difficult to predict where it'll be in five years, because as much as Blender is constantly evolving, so is everything else! Plus, other companies have the money to make significant enhancements to their toolkits as and when they wish. For now we'll say this – Blender may not be the biggest software in five years, but it's certainly not going anywhere.

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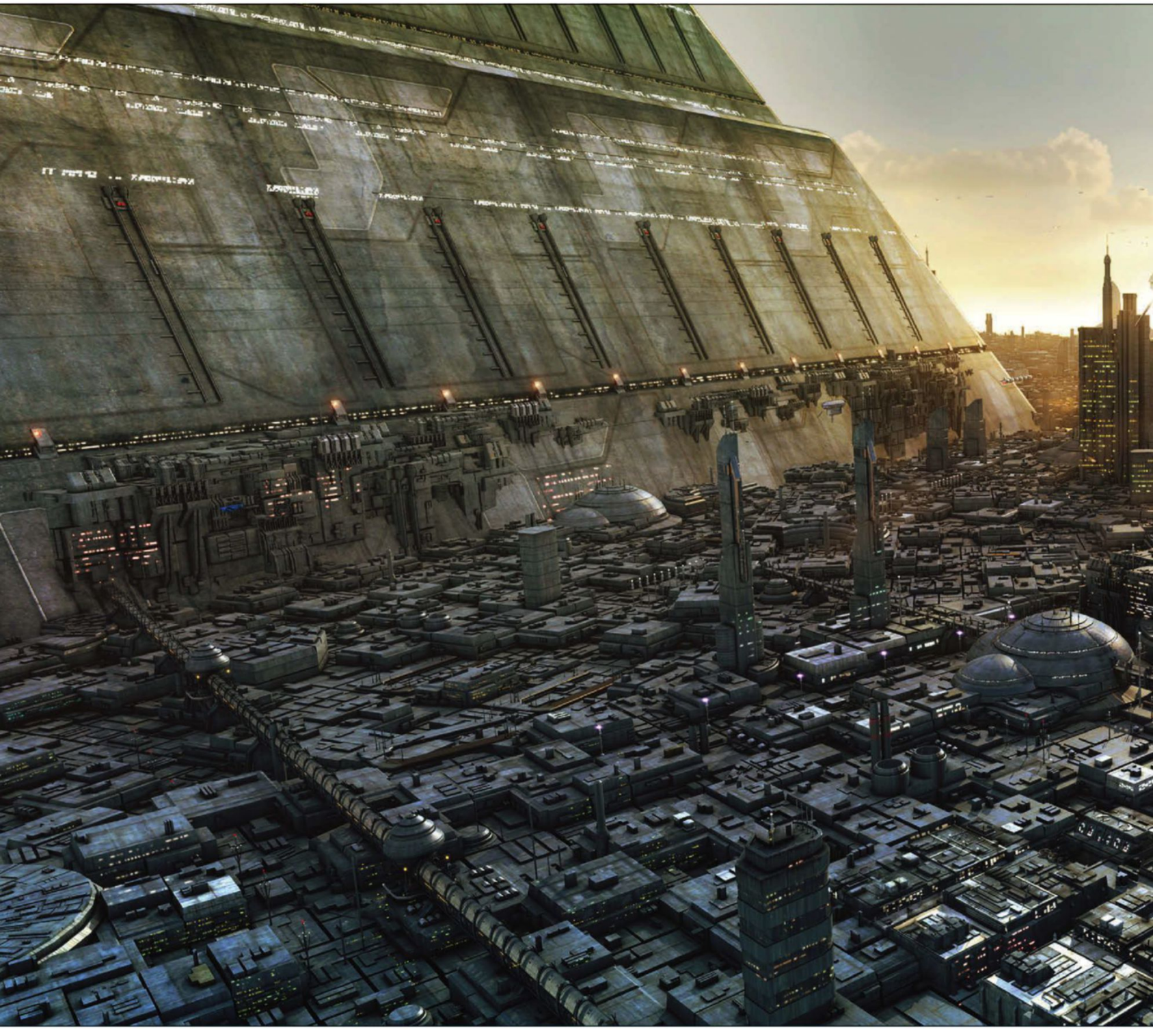


THE ART OF CG WORLDS

INDUSTRY ARTISTS REVEAL HOW THEY CREATE THE SPRAWLING CITIES AND IMMERSIVE VISTAS OF THE BIGGEST MOVIES AND VIDEOGAMES

Words: **Michael Burns**

"ENVIRONMENT ART IS BECOMING BIGGER, MORE COMPLEX AND MORE VISUALLY IMPRESSIVE THAN EVER BEFORE"
SCOTT HOMER, ENVIRONMENT ARTIST, CRYTEK UK
© Stefan Morrell

Environment art has a long and venerable history. Dating back to early film production as matte paintings on glass, beautiful drawings were used to convey the illusion of a deeper or richer world than those offered by a limited constructed film set. The discipline was then revolutionised by the use of digital matte painting (DMP). This has its roots in 1985 when, for a scene in *Young Sherlock Holmes*, a computer-generated knight was formed into a perfect composite with a digitally scanned painting. Further refinement came with the development of natural lighting algorithms such as Ray Tracing and Radiosity, as well as the widespread use of imaging software such as Adobe Photoshop.

The 2.5D technique posed yet another revolution. Here a virtual camera in 3D software moves through a wireframe representation of a set, with the 3D camera matchmoved to the motion of a real-world equivalent. The matte painter then creates custom texture maps to be painted onto the wireframe geometry and the virtual set is composited with the live-action film.

Environmental work has continued to develop in leaps and bounds, with everyone from arch-vis artists to videogame developers generating entirely new worlds. Join us as we take a look at the art form and where it's going next.

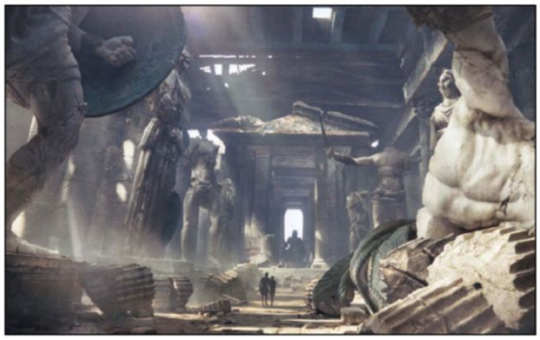
The art of CG worlds

Making a scene

Creating a CG environment is a complex process that requires a widespread knowledge touching on several disciplines. Modelling, texturing, look-development, lighting, compositing and digital matte painting all combine into this one discipline.

"On this shot (below) from *Wrath of the Titans*, only the two characters are from a plate," says MPC's Marco Genovesi. "Anything else has been modelled in 3D, lit and rendered in layers. These renders featured very basic textures and materials at first, but they gave us a good indication for the layout of the elements and the light direction. We then over-painted every object from the first to the last frame, using a mixture of photographs and pure digital painting. Next we reprojected and composited these layers together, adding atmosphere, volume lights and any sort of animated details to give the right sense of scale to the final image.

"Elements are always brought together and finalised in NUKE, which is the software we use to develop precomp scripts before we hand over the elements to the compositing department," Genovesi concludes.



Extensive environmental CG and set extension from *Wrath of the Titans*
© 2012 Warner Bros Pictures

Cinematic worlds

Marco Genovesi, global head of environment at MPC (**www.moving-picture.com**), says the first stage in creating environmental art for films is to discuss the brief with the VFX supervisor. Next he compiles a board of photos representing examples of the mood of the shot, lighting, location and additional details.

"Once you have received the first round of feedback, which should be based on your photo references, you might want to sketch something in 2D or 3D depending on the subject of the shot," he tells us. "My team and I usually work with Photoshop, NUKE, Maya and some custom tools developed internally by MPC. But often we also rely on other packages including ZBrush, Mudbox, MARI, SpeedTree and Terragen to name just a few."

The basic workflow for Cinesite (**www.cinesite.com**) environment supervisor Thomas Dyg typically starts in NUKE. He brings in tracked cameras for each shot to get an overview of the whole sequence. Simple models are used to block and lay out the scene. These can either use projections or are textured with photo modelling, skydomes and panoramas.

Genovesi says it's worth spending time verifying the layout of the objects at this initial stage – using 3D place holders to define the volumes in space. He also advises deciding the position of the render camera and possibly even the direction that the light will enter. "Having these key elements locked down will enable you to choose the most appropriate technique to develop the shot itself," he explains. "Your decision may vary between a 3D asset-based approach – which offers a great level of flexibility, but requires time to be developed and rendered – and a DMP technique, which will quickly provide you with a close-to-finished look. The latter has the downside of not being easily changeable or reusable if the camera changes position."

Since Genovesi is a DMP artist, as well as a generalist, he likes to mix the techniques as much as possible. "I often create textures as if I were painting an overcast DMP, keeping in mind the context of the shots I'm working on in order to focus on what's going to be seen on-screen," he explains. "For example, let's say we have to deal with a sequence in which we're framing a huge fortification wall from a distance, as well as close-up. In this case I'd generate two different sets of textures and assets, instead of trying to create something that works for both types of camera. I'll use pictures of distant walls for the first group of shots and photos of the same subject captured from a closer distance for the second group."

For this shot from *Prometheus*, MPC started from a stereo plate of clouds that were separated in layers. The team extended the scene with digitally painted mountain layers that were then reprojected onto simple geometry
© 2012 Twentieth Century Fox Film Corporation

"When approaching environments as complex as those we realised in Prometheus, you need to embrace a range of different options"

MARCO GENOVESI, GLOBAL HEAD OF ENVIRONMENT, MPC

There are also hybrid techniques that combine aspects of one approach with those of the other. "It's not uncommon to render some assets through a lighting pass, which is then tweaked in the compositing stage and gets a further refinement through a camera-projected DMP touch-up," Genovesi points out. "There are also times when we have to paint several lighting conditions for a single 2.5D DMP, which we then blend in compositing, simulating moving shadows and interactive lighting."

He continues: "When you have to approach environments as complex as the ones we realised in *Prometheus*, you need to embrace a range of different options to successfully represent the detail, the subtleties, the lighting and the weather conditions at different scales needed for the show. This is especially true if the schedule and the budget are tight."

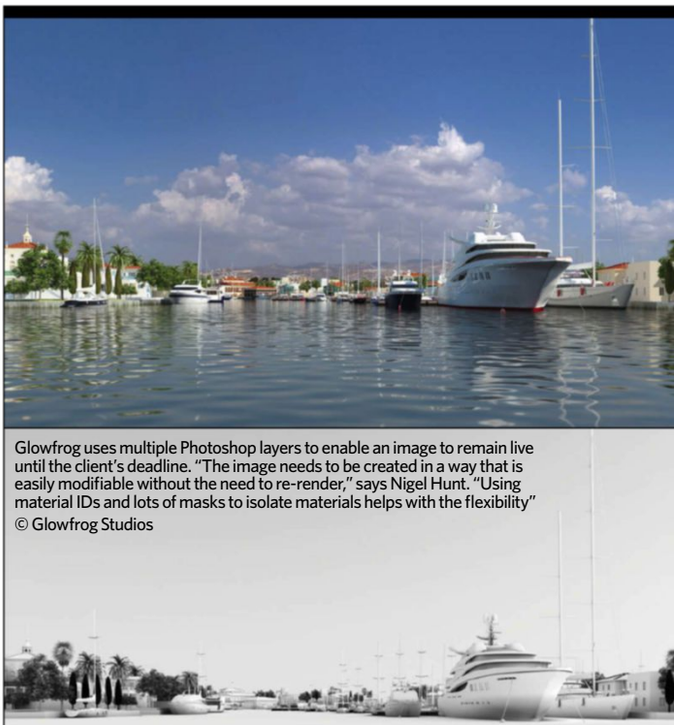
ARCH-VIS DESIGN

London's Glowfrog Studios (**www.glowfrog.com**) straddles two worlds, producing both film/TV VFX and architectural visualisation. A traditional arch vis workflow there begins with a brief and discussions with the client, followed by resource planning. The pre-production stage is next, including sourcing assets, gathering references and images, creating a basic geometry setup, compositing shots and making light studies to analyse the best time of day for the shot. The production stage follows, where complex modelling of hero buildings and assets begins, with environment elements added such as vegetation, 3D vehicles and 3D people. Lighting and texturing is then refined and the scene or animation is rendered in V-Ray at a high resolution.

"We typically render at 7-10k resolution with up to 15 passes to control the final look of the image or shot in post," explains Glowfrog owner and creative director Nigel Hunt. "Depending on the project, we will import all the rendered shots into Photoshop, After Effects or NUKE. Typically the visualisation artists will handle post-production as well, working in Photoshop to include additional elements, such as people, to the shots. We apply a lot of post work to the CGI in Photoshop, adjusting almost every material using the passes generated at render time. This gives the artists complete control to manipulate the image to clients' last-minute requests, without having to go back into 3D. On more complex DMP shots or animation sequences, the shots are passed off to our VFX compositors, who follow a similar approach but use After Effects and NUKE."

"We use NUKE to assemble the various elements that go into the environment," Dyg elaborates. "We have just one person to take care of setting the overall look for an entire sequence, adjusting things like haze levels, light interaction and grades, animating clouds, water and flickering distant city lights. They set it all up with a reasonable number of controls, in terms of mini scripts and EXR layers, for the compositors to pick up and integrate fully with the plate for each shot."

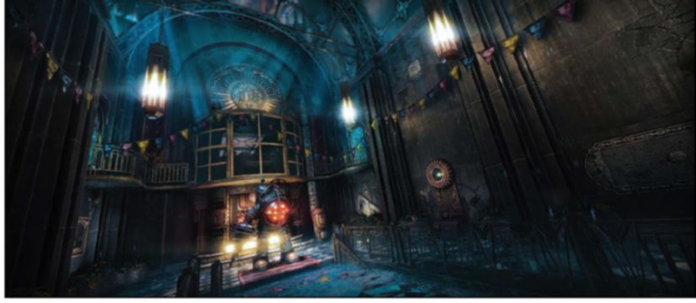
> "We apply a lot of post work to the CGI in Photoshop, adjusting almost every material using the render passes"
>
> **NIGEL HUNT,** CREATIVE DIRECTOR, GLOWFROG STUDIOS



Glowfrog uses multiple Photoshop layers to enable an image to remain live until the client's deadline. "The image needs to be created in a way that is easily modifiable without the need to re-render," says Nigel Hunt. "Using material IDs and lots of masks to isolate materials helps with the flexibility"
© Glowfrog Studios

A scene from *Iron Man 3* created from a helicopter shot. "The whole area has been turned into more of a park instead of parking lot," says Cinesite environment supervisor Thomas Dyg
© Marvel 2013

The art of CG worlds



Leading the eye

Environment artists use a number of techniques to provide a focus. "It's a cliché, but placing in focal points helps to draw the eye into the shot, as does composition of the light," says Glowfrog's Nik Van Herpt. "Using the Rule of Thirds can help proportionally balance the image."

Crytek UK's Scott Homer often tries to highlight focal points by brightening them. This makes them pop, while pushing the rest of the scene into the background. "I generally try to centre any visual noise on these areas, adding contrast to help bring the focal point to life," he says. "I often pull back any detail from unfocused areas in order to give the eye opportunity to rest."

"We can play with light and shadows, as well as atmosphere, contrast and colours, to make an area the focal point of a shot," says Marco Genovesi of MPC. "This is especially true when we deal with establishing shots that introduce a new location."

THE GAME WORLD

Though videogames present a more interactive experience than films by their very nature, environment artists often follow a similar workflow. Scott Homer, environment artist with Crytek UK (**www.crytek.com**), explains that his workflow has a lot in common with his counterparts in other fields. "A general rule of thumb with any environment is to first go through an extensive block-out phase," explains Homer. "Starting with bold shapes, I progressively iterate on this until I have grey box geometry in place. I try to paint bold brushstrokes and get the general forms in place as soon as possible, experimenting to see what works best before narrowing anything down. I often put budgets out of my mind at this point and try to create something grand in scale without limiting myself."

At this stage Homer also tries to ensure that the environment incorporates elements that can be reused, taking modularity into consideration. "This greatly speeds up the creation of assets and ensures that my environment makes the best use of the resources I have available," he explains. "From here I will often drop some lights and particles into a scene in order to capture the atmosphere of the environment and get a feeling for how it's going to look when the final art is in place."

Once everything is blocked out, Homer focuses his efforts on building small areas or focal points to pin down the style and main themes in the scene. "Taking elements of these areas and echoing them in the architecture will ensure the environment reads well and fits together," he says. "Once I'm happy with my grey box geometry, I begin to create the final art for the environment, starting with the base architecture and working downwards."

For creating assets, Homer tends to do all of his modelling in 3ds Max and any texturing within Photoshop. "In addition to these I'll often incorporate other utilities, such as ZBrush and Mudbox, into my workflow for sculpting and detailing that wouldn't be possible otherwise," he adds. "I find that Mudbox is a fantastically useful projection-texturing tool that makes removing seams from tiled/mirrored meshes a lot more precise."

Homer tends to display his in-game work using CryEngine, the game-development tool from Crytek (free for non-commercial use). "I have been able to seamlessly integrate it into my workflow, as it enables me to get the results I desire with minimal work," he explains. "For high-poly presentation shots I render in V-Ray."

Refining the look

Glowfrog has found that V-Ray is useful for building up detail in an environment piece. "We've adopted a V-Ray proxy pipeline whereby we can add millions of complex assets to a 3D scene without a noticeable reduction in render times," explains Hunt. "This essentially enables us to create complex cities, forests and so on using our large asset library. In addition, and if time is limited, we can adopt a traditional retouch/matte painting approach to the work by using camera projection and Photoshop to paint detail."

There are also many techniques that can be used to better enhance the illusion of realism in environment art. Homer feels that these mainly mirror elements of the photographic process in real life. "Effects such as chromatic aberration, dust or smudges on the lens, depth of field and lens flares can – if used sparingly – help to capture our own interpretation of reality," he says. "From a production art side, using carefully sourced textures and defining the materials in your Specular or Gloss maps can greatly enhance the illusion of reality. When working, I usually ask myself questions about each element: how does dust collect on upward faces? How does water collect on the surface? What would the surface feel like to the touch? The devil is really in the details."

"Perspective, scale, grading and the physical believability of the structure that we are portraying also plays an important role," suggests Genovesi. Even when creating unusual structures with little colour or texture, or viewing them from obscure perspectives, Genovesi says the only thing that remains constant is the physical behaviour of light. "It's difficult at first, but experienced artists can develop a special sensitivity for the way light interacts with objects and the atmosphere. They immediately feel if something is inconsistent or out of tune."

> "Artists can develop a special sensitivity for the way light interacts with objects and with the atmosphere"
>
> **MARCO GENOVESI,** GLOBAL HEAD OF ENVIRONMENT, MPC

"Assisting matte painting with global illumination renders of simple models takes most of the guesswork out of the angles of light and shadow, as well as indirect light or bounce intensities," Dyg adds. "Matte painting often assists by adding a lot of real-world scale and photo texture to an environment. By combining lighting and matte painting, you get the best of both worlds in terms of realism."

LIDAR scans and photogrammetry techniques are also commonly used across the board. "It's becoming common to scan a street and rebuild a digital model using the point cloud data," explains Glowfrog's head of visualisation Nik Van Herpt. "Photographs of the street can then be reprojected onto the geometry."

Looking to the future

"Environment art is becoming bigger, more complex and more visually impressive than ever before," says Homer. "Accessibility to videogame engines has greatly improved over the past five to ten years and the amount of hard work required to display in-game art has decreased."

Genovesi believes that the next revolution will come from the ability to quickly and cheaply scan assets from the real world. "This enables us to sketch environments starting from textured objects instead of using grey volumes or 2D references," he explains. "This approach would also be helpful with native stereo shows. These require a greater level of detail compared with 2D shows. The accuracy in the modelling, as well as in the layout of the elements, becomes a very apparent feature of the shots."

Dyg thinks environments would benefit from more artist-friendly shader, lighting and simulation setups for clouds and water. "Many types of software packages exist for these kinds of jobs, but very few of them can be considered artist-friendly," he explains. "Without this, creating CG environments will become a technical challenge rather than a creative one and cold universes will be the result."

Crysis 3 multiplayer map, Hydro Dam level. As part of a team of two, Scott Homer used single-player textures to kit-bash together a large portion of the level. He built the background using single-player assets in CryEngine 3

According to Genovesi, perspective, scale, grading and physical believability are all essential for great environment art
© Stefan Morrell

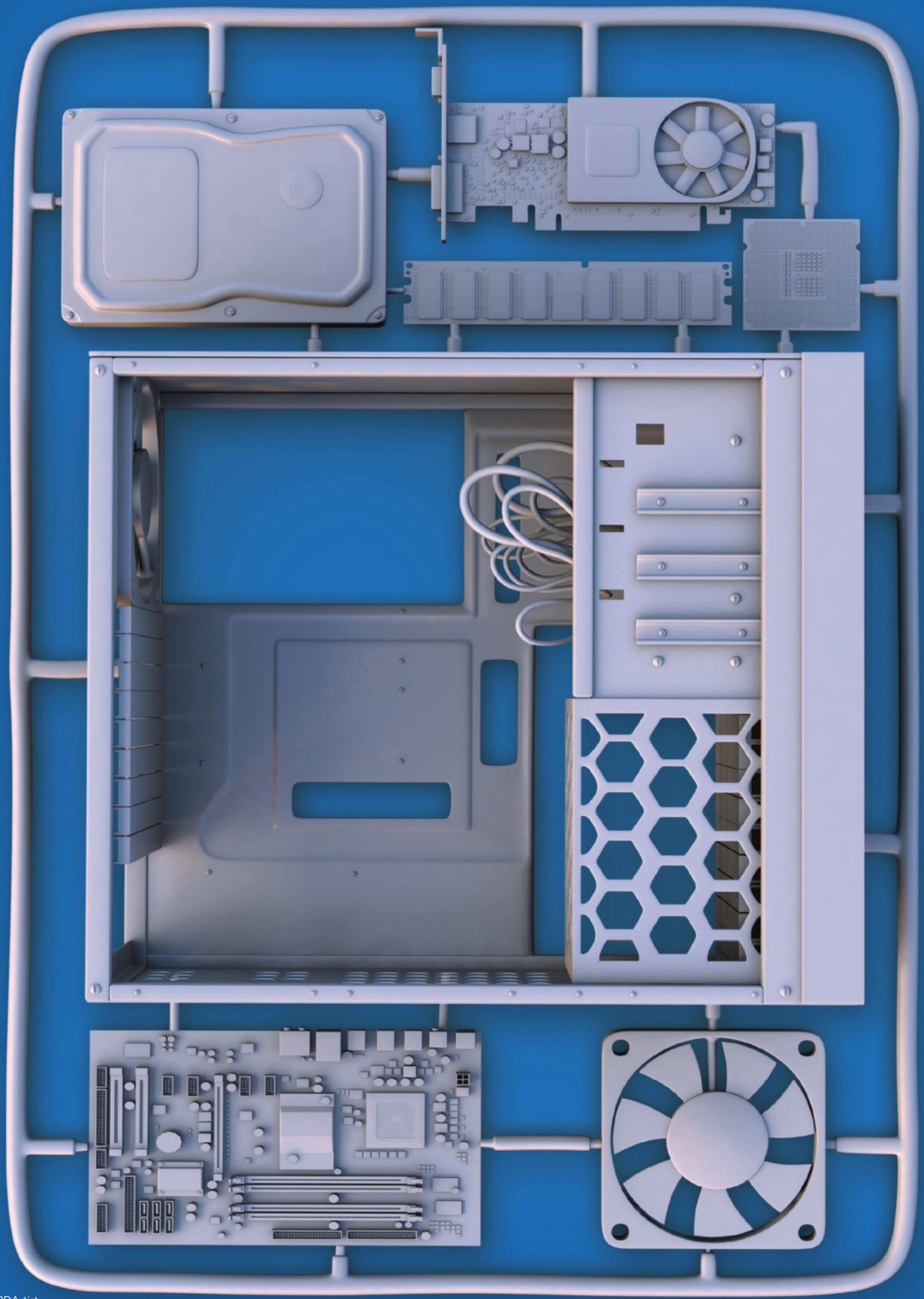
Glowfrog relies on V-Ray for rendering 90 per cent of its work. It has a V-Ray proxy pipeline capable of adding millions of complex assets to a 3D scene. This shot has over 3,500 V-Ray proxies
© Glowfrog Studios

Tips for scale

Instilling environments with a sense of scale is vital. "Using haze is one trick that always works," says MPC's Marco Genovesi. For videogame design, Scott Homer tends to drop average-height humanoid models into each environment, placing them in doorways and other areas. Glowfrog's Nik Van Herpt says that placing humans into an image to provide scale is also typical in arch vis. "However, placing other objects we subconsciously understand the scale of can help as well. These could be deck chairs, pot plants, bikes and so on," he explains. "Make sure you pay attention to the scale of textures as well. Knowing the correct size of objects in the real world, such as tiles, or natural elements such as leaf sizes and the age of bark, all give clues to the correct real-world scale."

"Even unrecognisable details in recognisable surroundings can help, such as adding dots for cars on a road," says Thomas Dyg. "We recognise the road and assume the dots sliding along it must be cars."

Build your own workstation



BUILD YOUR OWN WORKSTATION

We'd like to thank Scan Computers **(www.scan.co.uk)** for loaning us some of the components we've tested

All prices listed are taken from www.scan.co.uk and were correct at the time of going to print

3D Artist's resident tech expert, Orestis Bastounis, explains the components that can make an affordable 3D workstation, one piece at a time

If you're new to the world of 3D art or you're about to embark on a university course, your finances are unlikely to accommodate high-end workstations aimed at professionals. These systems contain some of the most powerful rendering hardware available, making them incredibly expensive for those on a budget. However, such advanced tech isn't necessary for artists who are still learning the tools of the trade.

Software such as Maya and 3ds Max won't run on the cheapest of PCs, but affordable pre-built workstations are more than capable of creating some great-looking work. Even if these are beyond your reach, then an affordable alternative option, one that offers greater flexibility and the potential for further savings, is to order the individual components. You can then either build the workstation yourself, or have it assembled for you.

Choosing the right components for a 3D workstation is a huge topic. There are countless brands, acronyms and technologies to study and choose from. This makes understanding what best matches your needs a total headache if you don't follow the latest trends and updates in computer hardware.

This is where **3D Artist** can help. We've hand-picked the components required to assemble a workstation capable of the best possible 3D-rendering performance, for less than £1,500. We've decided on the best graphics card, processor, storage, memory and motherboard to fit this budget.

Over the next few pages, we'll explain each of these parts, discuss the technology behind them and how they benefit a 3D-rendering environment. To cap things off, we'll explain the results from the various tests we made on the built system, using our usual benchmarking software.

Even if you aren't currently considering a new workstation purchase, our guide is filled with tips and background information to help you better understand exactly what goes into that box sitting under your desk and how it creates beautiful 3D results.

It's important to note that putting a computer together isn't particularly difficult, but there are many details to be aware of regarding assembly. If you're a beginner in this area, then we suggest you consult a professional or find a friend to do it for you.

NVIDIA's Quadro K2000 supports both OpenCL- and CUDA-based acceleration of software applications, but since CUDA is NVIDIA's proprietary compute technology, it often runs faster

Professional graphics cards, such as the AMD FirePro W5000, have multiple display outputs, powering up to three monitors from a single card. The extra space this provides makes it easy to work with several applications

GRAPHICS

Providing the means to display 2D and 3D visuals at a constant frame rate was once the sole function of a graphics card, or GPU. However, modern GPUs perform an additional role, processing certain general computing tasks faster than a CPU can.

Along with a vast amount of dedicated memory, GPUs contain large arrays of shader processors. These are small computing units that are simpler than the cores of a CPU but are greater in number. Running in parallel, each shader processor handles a small part of a single complex computing job, so a powerful GPU can provide a major performance boost for some of the software used by 3D artists, such as Adobe CS6 programs.

AMD and NVIDIA, the two biggest GPU manufacturers, offer graphics cards for either gaming or professional use. Although the basic hardware in each class of GPU is surprisingly similar, gaming GPUs (optimised for fast-moving real-time 3D) aren't suitable for rendering, which is an altogether different computing process. There's a greater emphasis placed on reliability and application compatibility with professional graphics cards too.

Different technical aspects of a graphics card contribute to its overall performance, such as the number of shader processors, the card's overall clock frequency and the memory bus's width. However, AMD and NVIDIA's cards work differently and therefore cannot be directly compared based solely on these specifications.

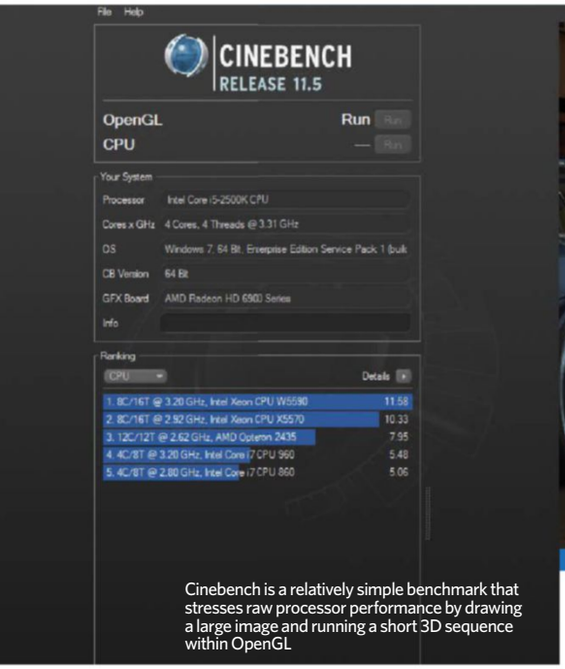
In a mid-range workstation, the choice is between a Quadro K2000, based on NVIDIA's Kepler architecture, or a FirePro W5000 graphics card, which uses AMD's Graphics Core Next design.

The K2000 costs around £450, while the W5000 is approximately £100 less. We've compared the performance of both cards (see our Results graph for the full details), but it's difficult to say conclusively which is better. In some tasks, most notably the Maya and LightWave sections of the SpecViewPerf benchmark suite, the FirePro pulls ahead of the Quadro, but in others the Quadro takes the lead.

Subjectively, while both are more than capable of providing the 3D rendering muscle required for a mid-range workstation, NVIDIA's Quadro is generally a more popular choice. This could be beneficial when you're looking for support with any issues you may run into with the software you use. But the price difference – and occasional superior performance – of the AMD FirePro W5000 makes it a more tempting prospect.

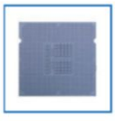
Our choice ✓

- **AMD FirePro W5000** (£364)



Cinebench is a relatively simple benchmark that stresses raw processor performance by drawing a large image and running a short 3D sequence within OpenGL

When testing performance, we render the underwater demo scene that's supplied with 3ds Max 2013, at 1,920 x 1,080 resolution. You can run the same test yourself if you install the software, even if it's only a trial version



THE PROCESSOR

A workstation's processor, or CPU, drives everything that happens on a computer. For tasks such as rendering, which includes a tremendous amount of calculations, the speed of the CPU has the biggest effect on the overall workstation performance.

There are some key factors to consider when buying a CPU. The clock frequency – measured in GHz – has a big impact on render times, so the higher, the better. Intel CPUs have a feature called Turbo Mode, where the system increases the processor's clock frequency by a small amount if under a significant load.

With careful manipulation of the settings in a computer's BIOS, a CPU's clock frequency can be raised further. This is a process known as overclocking. An overclocked CPU can perform better at rendering than a more-expensive model that runs at the standard frequency. This is a highly complicated procedure, involving the adjustment of many oddly named settings in the computer's BIOS. You don't have to handle this process yourself, however, as we'll explain later.

The number of cores in a CPU also has a big impact on rendering times. A core is a single processing unit and a physical CPU can house two, four or more individual cores. Software tasks that can be split into many small chunks, known as multi-threaded software – which includes 3D rendering tools – can be run simultaneously on multiple cores and therefore faster.

Hyper-threading, a nifty feature of some Intel processors, makes a single core appear as two in Windows, so a quad-core CPU behaves as if it has eight. The idea is that, if a core isn't being fully used, those spare resources can be diverted to process another chunk of the rendering task. This often results in significant performance improvements for your machine.

Intel sells desktop Core branded products and professional Xeon CPUs. Some of the most powerful workstations have more than 16 cores, but for a workstation suitable for our budget, four is perfectly acceptable.

This is why we've chosen Intel's Core i7-3770K, a quad-core, hyper-threaded desktop CPU that runs at 3.5GHz and strikes a perfect balance between rendering performance and value for money. It's a better choice than the less-expensive Core i5 or i3 range and measures up well against pricier options.

Depending on the CPU you buy, the layout of the connector pins limits your choice of motherboard. The Core i7-3770K requires a motherboard with an LGA1155 socket and you'll also need an efficient CPU cooling system, but we'll talk more about these two components on the next pages.

The Core i7-3770K is currently Intel's fastest quad-core desktop CPU. It runs at 3.5GHz, supports hyper-threading and offers enough performance for most rendering tasks

Our choice ✓

- **Intel Core i7-3770K** (£263)

Overclocking

HOW TO BOOST YOUR WORKSTATION'S POWER

Overclocking is fairly straightforward, but should only be attempted if you know what you're doing. A processor's clock frequency is determined from a base rate of 100MHz and a multiplier, so for a 3.5GHz processor the multiplier is 35. You can slightly raise this multiplier for faster speeds, but you also need to increase voltage to ensure the computer remains stable, which produces a great deal more heat and as such requires an efficient cooling system.

Pre-built overclocked workstations are guaranteed to run at a certain speed and the faster performance is covered by a warranty. If you still wish to build your own overclocked system, vendors such as Scan and Overclockers UK (**www.overclockers.co.uk**) sell bare-bone kits, including a motherboard, processor, memory and a cooler, all at only a slightly extra cost over buying the components separately. Best of all these bundles, and the faster speeds they offer, are still covered by warranty, like a full-sized workstation.

Build your own workstation

Solid-state technology

THE BENEFITS AND DRAWBACKS OF SOLID-STATE DRIVES

SSDs work very differently to hard disks. With data stored in Flash memory, rather than on rotating platters, there are no moving parts, so they're totally silent. Accessing data electronically is also far quicker, as there's no need to wait for the disk to spin up and they consume less power, which is great for laptops and tablets.

SSDs bring a whole new set of problems with them though, besides added expense. Flash memory can only be written to a certain number of times, so eventually an SSD will stop working. They also become slower over time, because small files placed around the disk reduce writing speeds. Ideally you should minimise the amount of data you write to an SSD.

However, both of these issues are less problematic now. Clever wear-levelling algorithms in the SSD ensure no individual cell is written to more than it needs to be, while Windows and Linux supports a technology called TRIM, which keeps performance levels high.

Western Digital brands its hard disks using colours and the Red series is designed for 24/7 use in network-attached storage (NAS) devices

STORAGE

Until recently, the only decision to make about storage was choosing a hard disk capacity. Now, things have become more complicated with the arrival of solid-state drives (SSDs), which are considerably quicker. They make a big difference to the time Windows takes to start and shutdown, how quickly applications load and they also offer a significant improvement to the machine's overall responsiveness.

They're expensive, however, considering the amount of storage you get. The ideal setup is to have Windows and applications loading from an SSD, with large media files, backups and so on stored on a larger-capacity hard disk. Our preferred configuration is a 256GB SSD combined with a 2 or 3TB hard disk.

Modern SSDs are usually quoted as being capable of reading at around 400MB/sec and writing between 200 and 300MB/sec. This is only with certain data, however, so don't expect these speeds constantly.

Intel's SSDs, such as the latest 520 Series, are popular with workstation vendors. This is partly thanks to the supplied SSD Toolbox software that enables easy maintenance.

However, it's the Samsung 840 Pro that takes the performance crown over just about every other SSD. With sequential write speeds of 500MB/sec and 100,000 I/O operations per second (IOPS), it outperforms Intel's models by a long way and is the best possible choice, despite being slightly more expensive.

As for the hard disc, priorities have changed now that SSDs are available. Performance has become less relevant, while low noise and reliability are desirable. Arguably it might be better to opt for a slower hard disk that's whisper-quiet, if it's only for storing media.

Although the largest hard disk capacity available is 4TB, these carry a hefty mark-up over 3TB disks, which can be found for as little as £90.

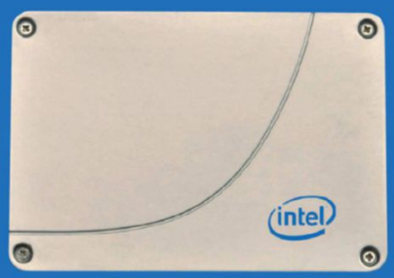
Our first choice for a hard disk is Western Digital's Red line. They're supposedly designed for 24/7 use in a network-attached storage device, pointing to better reliability and impressive near-silent performance. We measured 102MB/sec burst read speeds and 95MB/sec write speeds, which is more than adequate.

Both SSDs and hard disks are connected to the computer with a SATA cable, which will be supplied with the motherboard.

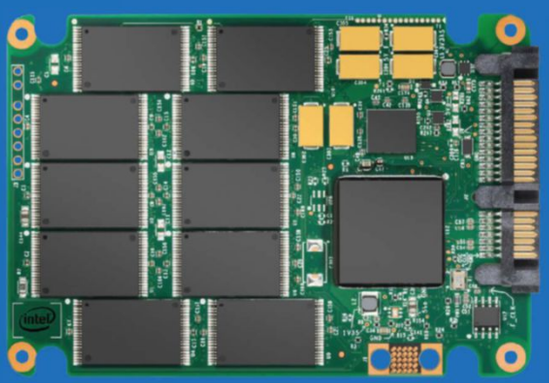
If you want to save money, choosing either an SSD or a hard disk, but not both, can save around £100. You could also opt for lower capacities than we've suggested.

Our choice ✓

- **256GB Samsung 840 Pro SSD** (£179)
- **Western Digital Red 3TB hard disk** (£116)



There's little more to SSDs than a few flash memory chips and a controller, which makes them less complicated than hard disks. They're also quieter, have no moving parts and are much faster to access files



Samsung is the only company that manufactures both the controller and memory chips in its own brand of SSDs. This is a potential reason why the 840 Pro offers the best performance of any SSD

Motherboards combine many essential functions of a computer into a single logic board. The PCI slots enable you to upgrade your workstation at a later date, with additions such as a second graphics card, RAID controller or video-capture card

A high-quality pair of matching DDR3 memory sticks, such as Corsair's Vengeance brand, is fine for a 3D rendering platform. Memory prices often fluctuate though, so you may pay more or less depending on market forces

Front-mounted USB 3, audio and FireWire ports, such as those on the Corsair Carbide 500R, are a handy addition, as they mean you'll spend less time reaching around to the rear of the workstation

Third-party CPU heatsinks combine small fins to dissipate heat efficiently with a huge fan. This keeps the workstation cool, even during heavy render sessions

The Corsair Carbide 500R is a great workstation chassis. It has plenty of internal fans, removable drive bays and comes with thumbscrews, so opening up the machine is relatively easy, if this is needed

MOTHERBOARD AND MEMORY

A computer's motherboard is the main logic circuit that connects all the components together. It houses the CPU, PCI-Express expansion slots for graphics, memory, audio, networking, SATA and USB ports. A Flash chip on the motherboard runs the low-level EFI software that enables you to tinker with the computer's basic settings, overclocking and configuring how the computer boots.

It's important to choose a motherboard that's compatible with your processor. The Intel Core i7-3770K processor requires a motherboard with an LGA1155 socket. You don't need to buy an expensive model, so we've chosen an Asus P8Z77-V LX2, as it has some great extra functions.

For 3D software, a large quantity of memory helps with performance, but there's no need for more than 16GB unless you're working on an incredibly detailed project, such as a simulation in Houdini. It's not worth paying for the fastest memory around, as the overall benefit is slim.

Memory is installed in pairs, so it's best to buy a kit of matching DDR3 memory sticks. We chose 16GB of Corsair Vengeance 1,600MHz memory, which is sold as two 8GB sticks.

Our choice ✓

- **Asus P8Z77-V LX2 motherboard** (£78)
- **16GB Corsair Vengeance DDR3** (£102)

Assembly advice

PUTTING IT ALL TOGETHER

Aside from practical tips, such as ensuring you work in a tidy, static-free area and have a Phillips screwdriver handy, there are some less obvious aspects of PC assembly that are worth bearing in mind.

The first task is to remove the CPU from its packaging, place it correctly in the motherboard's socket, then attach the CPU cooler, which will probably require a backing plate being fixed underneath the board. You'll need to apply a thin layer of thermal paste to the surface of the CPU cooler, which will be supplied. Remember, you have to apply this paste *before* you attach the motherboard to the computer chassis.

Placing the power supply and hard disks in the chassis is usually straightforward, but it helps to feed cables around the motherboard, through gaps in the chassis, to enable easy access to the inside of the computer.

Finally, always try to keep the motherboard manual at hand. You'll find a small line of connectors on the motherboard for the power switch, reset button and activity LEDs. The manual will helpfully explain exactly where to connect all of these.

CASE, COOLER AND POWER SUPPLY

The design of a computer's chassis isn't just for appearance. Ease of access, preferably without needing screws to open the case, helps when assembling the workstation or when upgrading later down the line.

Removable drive bays make it straightforward to install extra hard disks and good internal airflow matters greatly to keep the components cool by blowing air from the front to the back of the case. Also, badly made cases can be noisy, but many are now sold with noise-dampening rubber to reduce vibration.

The Corsair Carbide 500R is easily upgradeable, spacious and has a gigantic fan mounted on the side to improve airflow.

A mid-range workstation won't need an especially strong power supply. 650 watts should be perfect, but avoid the cheapest products, which are usually unreliable and highly inefficient.

A power supply with a fully modular cabling system means you only need to connect the most necessary cables. Otherwise, a messy bundle of unused leads would be left inside the case. This luxury adds significant cost, however.

Intel CPUs are sold with a basic CPU cooler, which works fine, but purchasing a high-quality third-party model means less noise and lower temperatures. However, these are usually extremely large and are often fiddly to install. We've chosen the Thermalright Macho, a highly efficient CPU cooler that kept the system running at an astonishingly low 30 degrees when idle. The sheer size of this heatsink obscured one of the memory slots though, so we swapped it out for an Arctic Cooling Freezer 13, which isn't quite as efficient, but costs £15 less.

Our choice ✓

- **Corsair Carbide 500R case** (£99)
- **EVGA 750W SuperNova NEX Power Supply** (£95)
- **Arctic Cooling Freezer 13 CPU cooler** (£23)

TESTING AND CONCLUSION

A good 3D workstation should provide the best rendering performance possible, with reliability, ease of upgrading, near-silent operation and low internal temperatures being desirable too. These are some of the considerations we look at when evaluating pre-built systems sold by vendors.

The components we're recommending satisfy these requirements, but new and better-performing technology is always on the horizon. Intel in particular is preparing a new line of desktop CPUs for launch this summer, which will outperform the current generation by some margin. This means it may be worth waiting for these new processors to go on sale before ordering new components.

Testing how well a workstation performs can be tricky, since every 3D artist will work with different software and create different types of scenes. Benchmarks are always useful as a precise way to compare one workstation with another using the exact same test, but they never exactly represent real-world use.

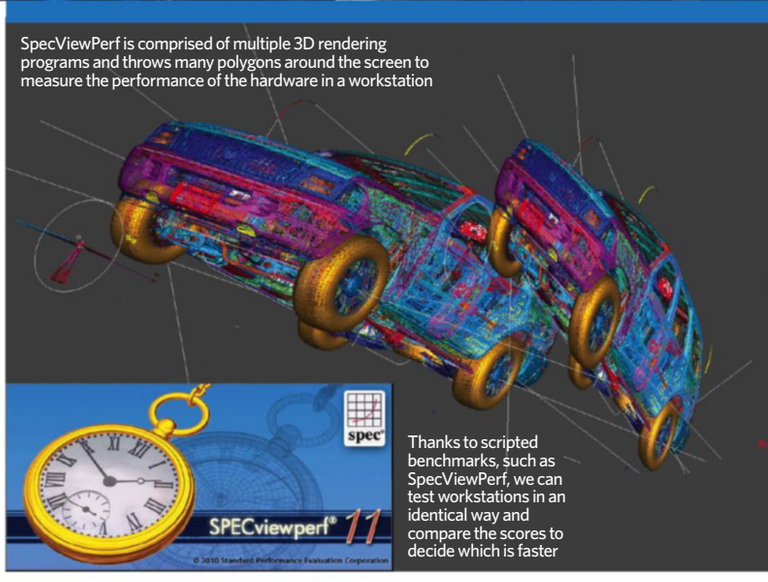
We used Cinebench to evaluate the general performance of the CPU and GPU, along with an underwater demo scene in 3ds Max rendered at 640 x 480 and 1,920 x 1,080, which mainly tests the CPU. We also use SpecViewPerf, a suite of eight 3D applications that delivers a performance evaluation based on the frame rate, while running through a series of set scenes. This draws some detailed geometry, pushing both the CPU and GPU to their limit.

The performance results of our workstation compare favourably with pre-built systems sold by workstation vendors, especially once we overclocked the processor. A rough 20 per cent boost to rendering shows the most significant performance gains possible from tweaking a few settings.

Overall, the question remains: should you opt to assemble your own workstation rather than purchase a pre-built system? This depends, as there are some downsides to consider. Although all components will be sold with a warranty, there is no support number to call if you run into any issues with a self-assembled workstation and no on-site maintenance on offer, which you do get from vendors. Also, although assembling a computer is mainly straightforward, some aspects, such as attaching a CPU cooler, can be fiddly. Purchasing a pre-built system saves you the hassle.

Finally, don't forget the extra hardware and software! You'll also need to budget for both a display, a keyboard, a licensed copy of Windows 7 or 8, as well as software to create and work with 3D models. Thankfully, if you're a student, Autodesk and other software vendors offer student licences of their products, while there are also a number of freeware rendering packages to use to develop your skills.

Our constructed workstation stood its ground in most tests we threw at it and still comes in under £1,500



SpecViewPerf is comprised of multiple 3D rendering programs and throws many polygons around the screen to measure the performance of the hardware in a workstation

Thanks to scripted benchmarks, such as SpecViewPerf, we can test workstations in an identical way and compare the scores to decide which is faster

3D Artist DIY workstation benchmark results

CONFIGURATION	Cinebench CPU Test	Cinebench Open GL Test	3ds Max Underwater Scene (640x480)	3ds Max Underwater Scene (1,920x1,080)	SpecViewPerf (catia-03)	SpecViewPerf (ensight-04)	SpecViewPerf (lightwave-01)	SpecViewPerf (maya-03)	SpecViewPerf (proe-05)	SpecViewPerf (sw-02)	SpecViewPerf (tcvis-02)	SpecViewPerf (snx-01)
Core i7-3770K (3.5GHz) AMD FirePro W5000	7.45	83.37	4:06:00	16:06:00	23.36	46.76	75.69	76.78	7.52	66.47	25.74	43.5
Core i7-3770K (overclocked to 4.5GHz) AMD FirePro W5000	9.02	95.72	3:25:00	13:14:00	26.28	46.78	87.98	90.15	8.85	77.72	28.9	44.29
Core i7-3770K (3.5GHz) NVIDIA Quadro K2000	7.53	59.92	4:10:00	16:01:00	42.78	27.88	52.34	52.97	17.13	46.83	36.8	32.53
Core i7-3770K (overclocked to 4.5GHz) NVIDIA Quadro K2000	8.97	60.34	3:23:00	13:08:00	43.2	28.4	57.15	53.23	19.82	48.94	37.07	32.75

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THE METHOD WAY

As the near-simultaneous Oscar win and bankruptcy of Rhythm and Hues proves, it's a tough time to be in VFX. Poz Watson finds out how Method Studios is weathering the storm

METHOD STUDIOS

Locations LA, Vancouver, New York, Chicago, Detroit, Atlanta, London, Sydney, Melbourne

Website www.methodstudios.com

Portfolio highlights:

Cloud Atlas, 2012

Argo, 2012

Iron Man 3, 2013

Company bio Founded in 1998, Method Studios is a prolific company with credits on everything from high-end feature films through to music videos, commercials and motion graphics. It provides a range of services, including look-development and final compositing.

© 2012 Warner Bros. Entertainment Inc. in The United States of America and Canada
© 2012 Cloud Atlas Production GMBH and X Filme Creative Pool GMBH

> Part of our success has been the ability to temper the wild fluctuations in demand: the feast and famine of the studios

Patrick Davenport, senior VP of global operations

The Method way

Working in VFX today may be difficult, but Method Studios seems to be going from strength to strength. Perhaps less well-known in the UK than in the US, the company certainly has an international footing – with offices in New York, Atlanta, Chicago, Detroit, Vancouver, Sydney and Melbourne, as well as LA and London – and it's growing an impressive showreel of big-feature projects. "As we have grown, the goal has been to attract challenging work on high-profile films," says VFX supervisor Matt Dessero, adding that "each project has had its own unique challenges, ranging from building fantastic futuristic worlds for *Cloud Atlas* to playing a supporting role and creating invisible effects for films like *Argo*".

"It's a difficult time in VFX, especially on the features side, and the tax incentives are driving where the work is done," explains Patrick Davenport, Method's senior vice president of global operations. "Often the challenge is bringing in the right teams... A lot of my time is spent finding the right artists, producers and supervisors. You have to spend time building the team, because that's such a fundamental issue."

It's this artist-centric approach that seems to be shoring up Method's position in the marketplace. It wasn't even in features until 2010, but now 50 per cent of its work is films and 50 per cent is commercials. It has more than 500 employees worldwide and is in the process of expanding its Vancouver and London offices.

Method Studios is owned by Deluxe and, as Davenport explains: "The evolution of our growth has been via acquisition." It has strong roots in the Vancouver office, which used to be Rainmaker Visual Effects and that part of the 90s movement of making TV out of Hollywood.

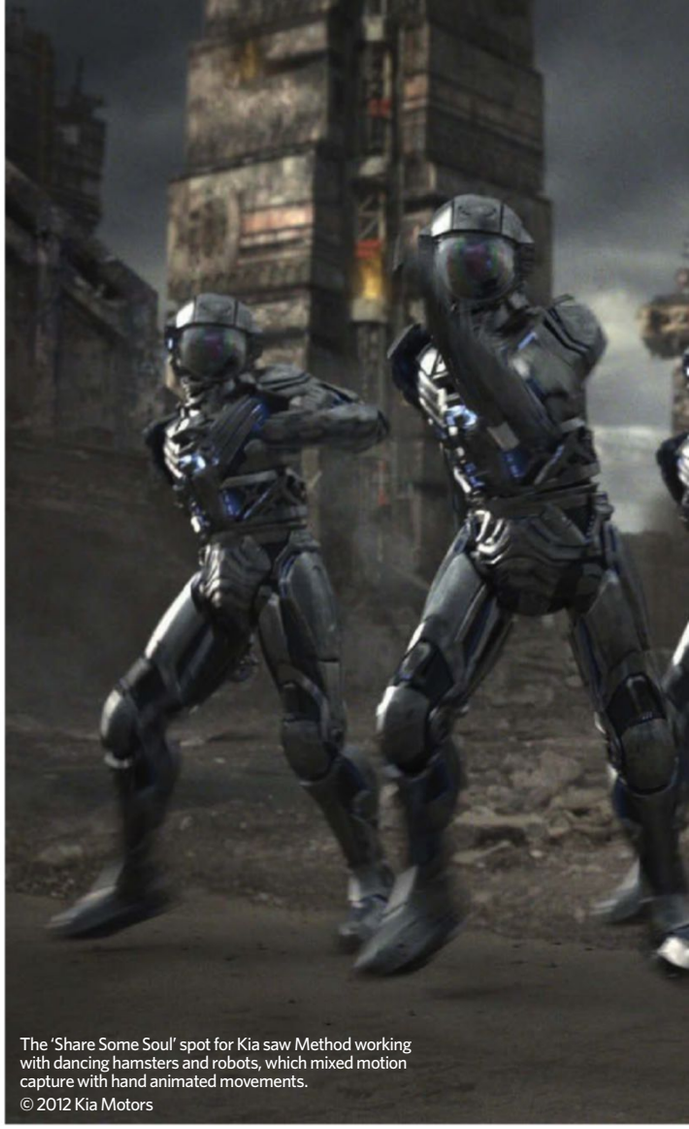
As time has passed, the various offices have all expanded by a significant amount. "In the last three years, for example, our LA office has grown from around 80 employees to 170," Davenport continues. This expansion has been based on building effective teams. "Of those 170 employees, we've only got about 15 freelancers at the moment, so the majority are staff," Davenport explains. "This is very different from the Method I joined, which was pretty much split 50/50. This transition is one of the reasons for our success."

For Christian Kubsch, the company's new president, it's all about "making sure the artists feel they have a voice." Davenport explains that "one of the things we tend to do here is hire people as staff and nurture them. We employ a lot of artists at entry-level and then train them into the Method way..."

'The Method way' is about its supervisors being able to turn their hand to anything, as VFX supervisor Mark Breakspear explains: "We know that there are supervisors who have a background in effects, or a background in compositing... and I certainly come from a compositing background. However, all our supervisors have to have on-set skills, they have to be able to communicate at the highest level... our clients demand the best-quality work and I think we provide that."

Chief creative officer Dan Glass says that "Method is a company that's built upon a passion for artistry. We take great pride in the work we produce and always aim to push the quality above and beyond our clients' expectations. Though we are very capable of delivering to a tightly specified brief, we are also more than comfortable when collaborating on creative solutions. We are constantly encouraging and seeking out individual artists who thrive in that kind of environment."

Being a company of team players is also key, as VFX supervisor Benjamin Walsh simply puts it: "There are a bunch of companies worldwide that deliver fantastic-quality work on features and commercials. Method has worked very hard



The 'Share Some Soul' spot for Kia saw Method working with dancing hamsters and robots, which mixed motion capture with hand animated movements.
© 2012 Kia Motors

© Method Studios

With offices in nine locations spanning three continents, Method has had to utilise innovative ways to bring the teams together

Method's work on *Argo* mostly consisted of invisible effects during the climax of the movie

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For its work on *Cloud Atlas*, Method worked on around 400 shots that it was able to distribute among its global offices

This is a recent spot for Isis, in which a dog and a cat run amok in the supermarket – in reverse order

AHEAD OF THE GAME

VFX SUPERVISOR MARK BREAKSPEAR TALKS ANGELS AND DEMONS

"We had already done *Da Vinci Code* with Angus Bickerton and we made a couple of environments that were impossible to get into with a shooting crew. The Vatican authority was very hardcore about shooting there. So for *Angels and Demons* we had to be ahead of the game. Anticipating the sequel at the end of *The Da Vinci Code*, we went ahead and shot a lot of the places, like St. Peter's Basilica. We posed as architectural students and over the course of a week took 15,000 images of the inside of these churches, which we essentially used to create a giant map. We did get stopped at one point by the Vatican police, who asked us what we were doing, which was a bit dodgy and I was worried about how we were going to smuggle the compact Flash cards out of the country..."

For *Angels and Demons*, Mark Breakspear re-created the interior of the Vatican, using reference to over 15,000 images

to earn a spot in this upper echelon, so when it really comes down to the nuts and bolts, it's relationships that matter. Whether it's internal or with clients, you need likable people to be successful... and Method has great peeps."

While Method isn't quite unique in terms of hiring people as staff, it does make the company stand out in North America, where most of the big players use small teams and legions of freelancers. But, as Davenport stresses, the benefits of the Method way "vastly outweigh any cost-savings that you theoretically might have". While one studio might not have enough work at any one time, another of the offices might be rushed off its feet. "Part of our success has been the ability to temper the wild fluctuations in demand: the feast and famine of the studios," continues Davenport. "So part of our strategy for being a sustainable and viable business is to utilise all our resources around the world as effectively as possible."

Last year, in the lead-up to the SuperBowl, Method LA and Method New York were swamped with commercials for the big day. The work kept coming in, so Method Sydney took two commercials, which otherwise the studio would have had to pass on. Method sometimes goes further than that too. If there's a need for artists in LA and there's availability in New York, for instance, artists have been known to fly across the country. "While it's a bit more of an expensive proposition than working remotely, it does build team spirit and you build trust, so I'm a big proponent of doing that wherever possible," says Davenport.

Studios work together on projects too, of course. Recently Method was the main VFX vendor for *Cloud Atlas* and the 398 shots were parcelled out to the London, LA and Vancouver studios. Another thing that

> "We take great pride in the images we produce and always aim to push the quality beyond our clients' expectations"
>
> **Dan Glass,** chief creative officer

The Method way

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As part of its *Cloud Atlas* commission Method had to construct the futuristic world of Neo Seoul

> "At Method LA we didn't do much feature work prior to 2010 and now I'd say 40 per cent of our work is features"
>
> **Patrick Davenport,** senior vice president of global operations

makes the company stand out is that it hasn't set up or bought a studio somewhere labour would be cheaper. Instead, the offices are either clustered around the world's VFX hotspots or – in the case of Chicago, Detroit and Atlanta – designed "first and foremost to support the commercials market in that areas, but with the possibly for those office to work in features as well", as Davenport puts it.

Expansion is still the name of the game. Davenport says that in the New York office, the team have "gone from 15 employees in 2009 to over 50 now. Plus, with the tax incentives for features in New York, we have a number of features going though there right now, which is exciting".

In Vancouver – where they currently have a team of 150, though many of them are long-term freelancers, given that's the culture there – they're expanding the studio too. Also, at the end of April, Method London moved from shared facilities it had on Wardour Street to a purpose-built studio on Meard Street, enabling it to take on bigger feature challenges.

"The current location now has the potential for over 100 creative seats," says Drew Jones, VP at the London HQ. "The new location has also allowed for the siting of a focused Art department. The team of artists are involved in all aspects of production, from very early pre-production concept work through to character and vehicle design, as well as seeing DMP work through to final execution."

The gradually increasing numbers at Method and its ability to work across multiple shows simultaneously will be pivotal in the coming years. The studio already has massive credits on the likes of *Iron Man 3*, *Cloud Atlas* and *Argo*, and is currently working in-house on projects such as *The Hunger Games: Catching Fire*, *Monuments Men*, *Jupiter Ascending*, *Guardians of the Galaxy* and *Sunshine on Leith.*

Considering the calibre of work, it's astonishing how little time the company has actually been working in the features space. Davenport credits the hiring of Dan Glass as a big part of this move, noting "he has real clout with the studios, so his joining was really crucial to our expansion into the world of features. At Method LA we didn't do much feature work prior to 2010 and now I'd say 40 per cent of our work is features".

Darin Grant, chief technology officer, says that Method "is primarily a Linux house, with a smattering of Macs across the facility, particularly in our Design division. From a hardware perspective, we have been and will continue to be pretty agile, adopting the latest and greatest technology available regardless of manufacturer. Similarly, for software we use the typical content-creation and production-related packages in the visual effects industry, in conjunction with our own special sauce to make it all work together". VFX supervisor Matt Dessero adds that the past four years has seen Method "put together a solid set of tools for our feature VFX

Though the studio now handles a lot more feature work, Method's roots still lie in – and are informed by – its earlier commercial work
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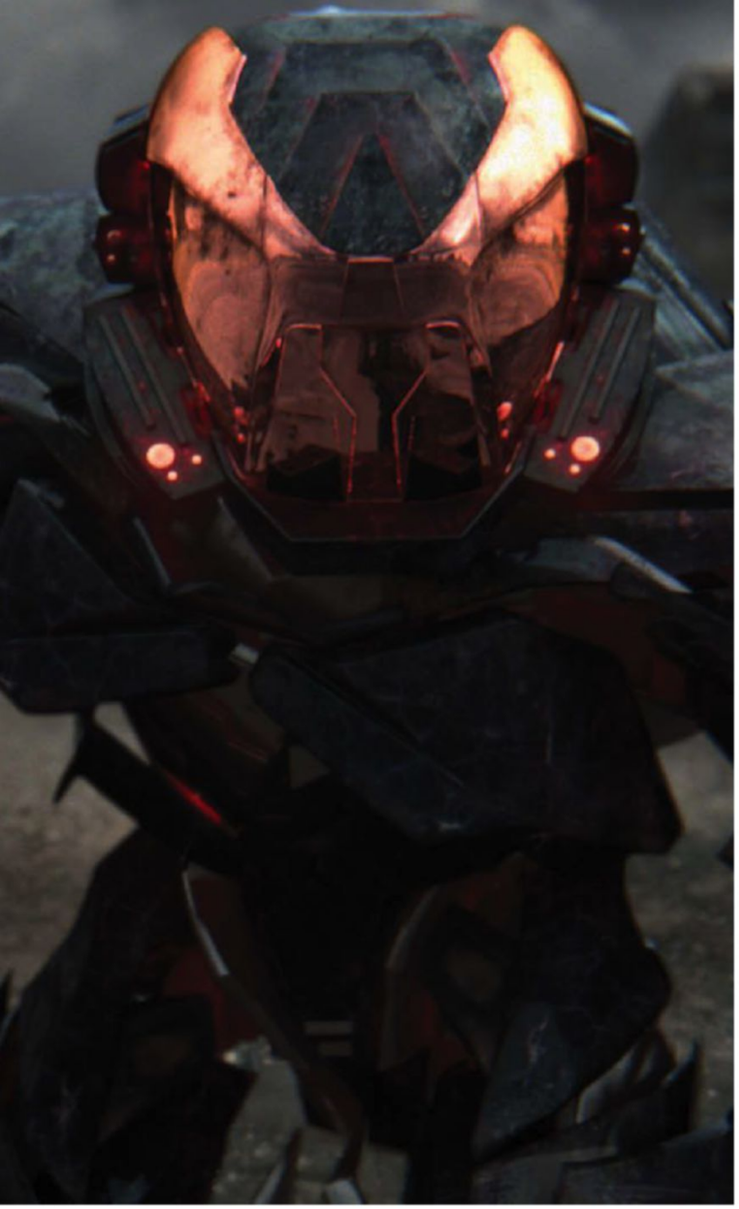
The studio now combines a wide range of software, including Maya, Houdini and NUKE, to complete its feature work



CLOUD COMMUNICATIONS

DAN GLASS EXPLAINS METHOD'S WORK ON CLOUD ATLAS

The VFX for *Cloud Atlas* was a big challenge for Method and one it split over three locations. LA had 70 artists on a 40-week schedule to produce 200 shots. These included full CG shots of the futuristic city Neo Seoul; fight and escape sequences; various CG vehicles; and digital makeup-retouching work. London produced the concept design work and matte paintings, which took 29 weeks and 22 artists. Vancouver had 30 weeks and 34 artists to create over 100 3D buildings.

This split between the offices was to encourage "collaboration between the teams for the shared constructed assets, but also to grant each studio distinct ownership over their own sequences from start to finish. The fact that the studios are connected helped a great deal with the sharing of developments, as well as providing a greater range of ideas to contribute to the various design challenges," says Dan Glass.

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Method galvanised several of its dispersed offices to work on *Cloud Atlas*

pipeline, while never forgetting our commercial roots. There is a lot of respect for the fast pace at which our commercials run and we utilise many commercial techniques for our features".

Commercials are still a big part of the business, of course, and Method's reputation in this area is strong. VFX supervisor Nordin Rahhali picks out a spot completed for Kia, called 'Share Some Soul', as a recent highlight: "This was a very ambitious commercial, which was delivered in roughly eight weeks of post. The premise of the spot was that a group of heroic hamsters drive up in their Kia and begin to dance. This gets two warring alien factions to stop fighting and join in."

The 60-second spot was shot on a stage with giant greenscreens. Most of the environment – apart from some foreground and mid-ground set dressing – was CG, as were all the characters, except for the hamsters, which were dancers shot in fat suits. Rahhali adds: "In order to make fast dancing hamsters more manageable to matchmove, we set up witness cameras and took extensive surveys of the set and each character. Animation rigs were built for each of the actors. Matchmove would lock the track and animators would take over to add performances. For the two alien races, we used a mixture of motion capture and good old-fashioned key-framed animation. We tried to use motion capture when we could, but often the post-captured dance moves required more art direction. Since the two alien races had somewhat unique physiology, it was easier in some cases to use the motion capture as a guide and get the specifics addressed with keyframed animation."

One of the benefits of the Method way, Rahhali adds, "is that the pipeline we use is mostly the same for both the commercial and feature side of production. A CG-heavy project like Kia's is run like a 50-shot feature. Similar team structure and the same toolsets are used for both. This makes for a smoother transition for artists moving between shows".

As high-end commercials like this indicate, Method is now committed to growing its animation expertise. Kubsch notes: "There are lots of great VFX places, not so many good animation places." To that end the company has just hired three new high-end animation artists. Erik-Jan de Boer, the new animation director in Vancouver, is fresh from *Life of Pi* Oscar-winning glory; while new animation supervisor Keith Roberts, who will work in LA, also hails from the previously troubled Rhythm and Hues.

Creature supervisor James Jacobs is another Oscar winner, having won a scientific award for the character-simulation software on *Avatar*. He has joined the Vancouver team.

It's an exciting line-up to say the least, but now the challenge is on for these artists to take Method's animation work to new heights. De Boer explains: "From *Babe* to *Pi*, I somehow seem to have specialised in photorealistic animals and creatures. One of the things I will be doing at Method Vancouver is expanding the current animation department and building a team that has a solid understanding of physicality, biomechanics and animalistic behaviour. I also hope that my past experience of running projects across multiple facilities

Method has worked on many increasingly prominent films over the past several years. These span from Oscar-winning dramas like Argo through to adventure films such as 2012's **Journey 2: The Mysterious Island**
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HITTING THE JACKPOT

JASON SCHUGARDT ON HOW METHOD IS STILL CREATING HIGH-END ADVERTS

With 50 per cent of its business in commercials, and with offices in LA, New York, Atlanta, Chicago and Detroit, Method is a major player on the US ad scene. VFX supervisor Jason Schugardt recently completed a spot for the California Lottery, directed by Oscar-winner Janusz Kaminski.

"Most of the spot's 40,000 live-action lotto balls were fired from off-screen by air mortars and filmed at 250 frames per second," says Schugardt. "When the angle or distance wasn't practical for real balls, Method helped out to extend, fill in or in some cases completely replace the live-action balls. These had to cut and often sit right next to our CG balls in-frame, meaning that our lighting and environment integration had to be spot on. We laser-surveyed the locations and built simple models that the FX department used to run ball simulations against. We also used these models to project our HDRI lighting probes onto. The result was a beautiful visual piece that lures you in and makes you dream of what it would be like to hit the jackpot."

© 2013 California State Lottery

Over 40,000 lottery balls feature in the advert, many of which were enhanced or even created from scratch by the Method team

> "Given the changing economics of the industry, we're looking towards efficient use of resources, both human and machine"
>
> **Darin Grant,** chief technology officer

will help us to leverage the strengths and resources of the worldwide Method group on larger projects."

Animation was one of the key challenges on *Journey 2: The Mysterious Island*, which was the first big stereo project Method handled. There were some CG butterflies to create, as well as a huge environment to build. "One of the early challenges was the sheer size of this jungle environment that we were building," says Breakspear. "There's only so much you can do with matte painting, so you have to be able to build an awful lot of 3D. Then there's a struggle to get that rendered. Even with the setup we have, we're always pushing that barrier... if you're not hitting that barrier, you're not trying hard enough." There are other challenges to consider too: "There are a lot of people out there shooting stereo and whether you're a supporter or not, it's out there and you need to be able to do it."

You also need to be able to do it globally, which is why one of Method's biggest challenges is to further connect its various worldwide offices. As Kubsch puts it, he wants it "to make no difference whether the person you're working with is sat at the next desk or is sat in London."

The new CTO, Darin Grant, is tasked with harnessing all of Method's global resources. "Given the changing economics of the VFX industry, we are looking towards more-efficient use of resources, both human and machine," he says. "This will enable artists to work from one location on a project housed at another; balancing what needs to be done locally with what can be off-loaded to off-site data centres or even the cloud."

These technological and animation challenges all contribute to the 'feast or famine' nature of the VFX industry. However, Davenport admits "there's still a lot to do, but we do have a firm foundation in terms of talent".

What all this comes back to is making sure that the clients and the world realise that VFX artists really are artists, not just people who know how to flip the right switches in the right software packages. "We're not just a bunch of nerds obsessing about the pipeline (though we do have those people)," says Breakspear. "We simply love making movies."

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Artist info

Erasmus Brosdau

Website www.erasmusbrosdau.crevado.com
Country Germany
Software used 3ds Max, V-Ray, Photoshop
Bio Erasmus is a cinematic artist and generalist at developer Crytek

> For rapid work such as this, you need a strong understanding of SubD modelling. Model as fast as you can, but don't be super-critical with edge flow or quad poly modelling

INT-67 Bergsteiger 2013

I wanted to see what it was possible for me to create from scratch within one weekend, so I drew quick concepts and worked ten hours on both the Saturday and Sunday. These 20 hours included blocking out, high-poly SubD modelling, textures, lights and materials. Everything was completely invented and created from 0 to 100 per cent, on-the-fly, during the modelling stage.

Software used in this piece

3ds Max | V-Ray | Photoshop

“Blocking is the most important stage – create a super-rough 3D model, then stick some blocks and cylinders together to get a feel for the volume and the silhouette of the model. Just imagine the rest at this stage and make sure you're happy with the blockout”

“This whole model is a simple UV-mapped box. I made materials that automatically created scratches and dirty seams on the edges with V-Ray. For the logos I created a texture with the cut-out letters in an Alpha channel, assigned it to a simple Plane object, put it close to the Mesh and disabled Shadow Casting”

ZBrush Maya V-Ray Digital Fusion

Learn how to

- Model and texture a high-res scene with a shark
- Choose good composition and pose; model and arrange the scene's various elements
- Prepare the dramatic lighting for the scene
- Composite the separate render passes

With the Disc

Tutorial files:
Iliya has supplied settings for his particle flow, materials, lighting and renders

Underwater renders

Diving with sharks 2013

"I wanted to re-create a scary diving moment, when you are surrounded by a huge school of fish and a great white shark bursts through them"

Iliya Atanasov is studio director and lead artist at Pixelhunters

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Iliya Atanasov

Professional portfolio site www.pixelhunters.com

Country UAE

Software used ZBrush, Maya, V-Ray, Digital Fusion

Expertise I am a CG generalist with a strong sense of the details that make a difference

Here we'll be working through the process of creating a dramatic underwater scene, complete with a ferocious shark at the centre. We will explore tips for modelling all elements in the scene using ZBrush and Maya. We will then focus on texturing these elements, as well as how to create an effective light rig using V-Ray in Maya. Next we'll render a number of different passes, including Color, Specular, Reflection, MaterialID and Z-Depth. These elements will then be assembled with the final image to add life to it. To finish, we'll play with different colour corrections to achieve the final look. The modelling of the shark was completed by Lei Zheng.

Concept

The idea behind the image is to re-create one of those moments when a diver can get too close to a huge monster: the great white shark. I wanted to achieve a scary, photoreal look, but at the same time to have this dreamy stylised feel, as it's also heart-stopping moment to swim with a shark.

Establish your base mesh

Move between Maya and ZBrush via GoZ to build an initial shape

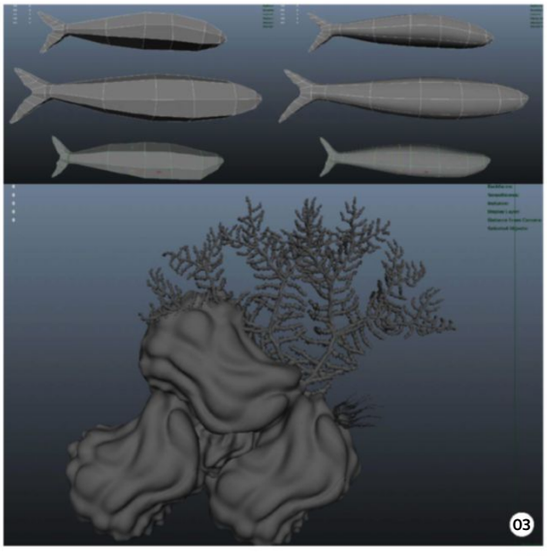
01 Sculpt the body Divide the base mesh several times, using the Move tool and Clay brush to define the shape. Move from low-res subdivisions to higher-res subdivisions to change the larger forms to smaller details. Try to keep the sculpt on the lower subdivisions as much as possible.

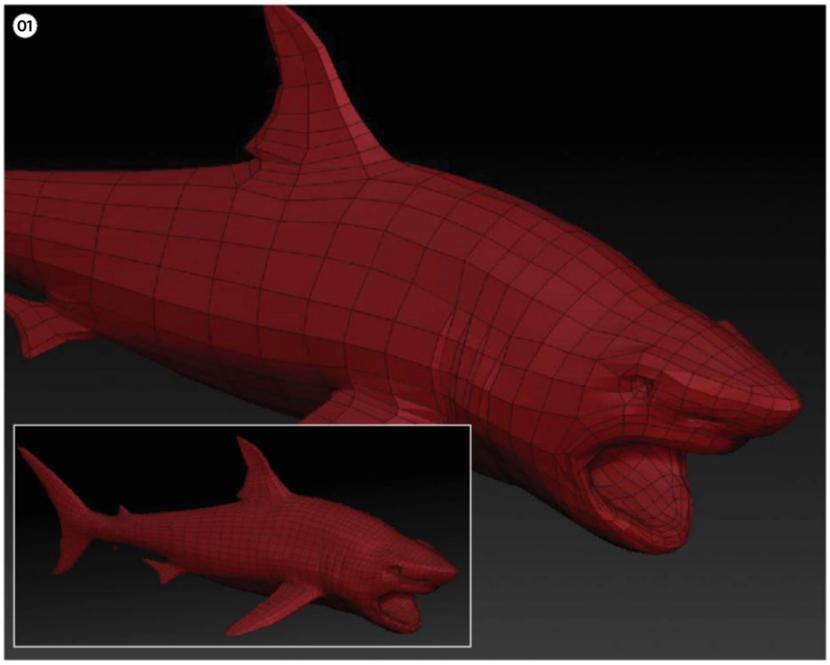
Why model the whole shark?

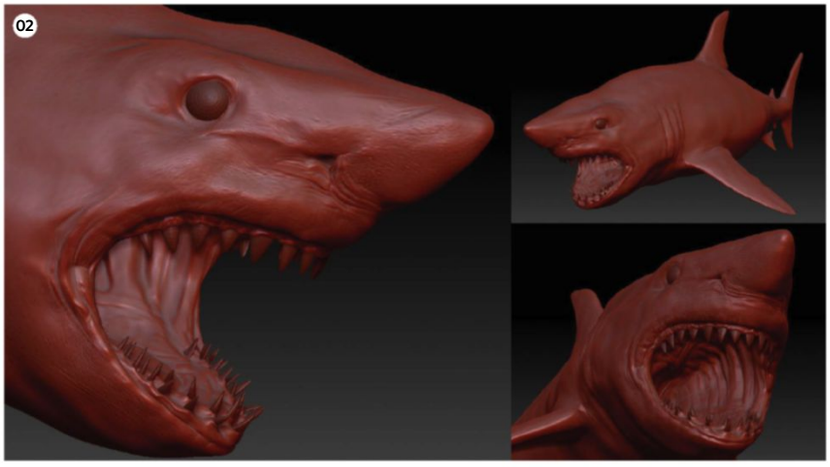
The main aim of the image is to re-create the feeling of being right next to a huge monster, which will be stronger if we're closer to the mouth of the shark. Developing the full body with the tail will help if we decide to change the composition and can see more of the model's interior.

02 Detail the face We should pay a lot of attention to the face, especially the mouth area and teeth, as they will be the largest parts in the final work. Make the brush slightly smaller than the previous steps to help add very fine details. Go a step down to the low-res level and reshape the tail a little to conform to the final render pose.

03 Model small fish and other elements The idea here is to model a low-poly object with a few variations on the tail and textures, which can later be used for emitting instancers. Take a sphere with eight spans, extrude/move the vertexes back to form the body and make a couple of variations to be smoothed later. As we're dealing with a huge amount of fish, multiplying them would take too long, so add an emitter to produce particles that will follow a path. Later you can add in your fish models to take the place of the particles. For the corals, use a low-poly sphere primitive from Maya with 30 spans and delete the half that won't be visible to save memory. In the Polygons tab, go to the Sculpt Geometry tool to reshape the rock. You can also make loopable textures in Photoshop from real coral images. Include other types of corals and creatures, use the General Editors>Visor>Paint Effects and convert them to polygon objects.







ZBrush tips

There are a whole range of ways you can customise your ZBrush interface. Gaining access to the most commonly used tools will greatly speed up your workflow. When working with Move tools or some large-radius brushes, the various Automask settings are very useful to keep brushes on the area you want affected, you can find these settings in the brush's Auto Masking menu. Also, assigning the brushes you use frequently to numbers on your keyboard is a must. Simply hit Cmd/Ctrl+Opt/Alt on any brush tool, then press the shortcut you want it be.

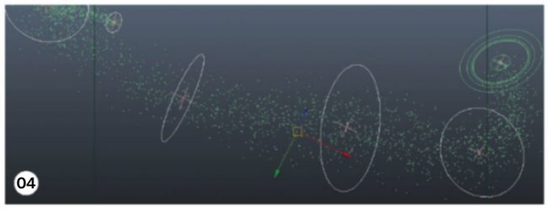
01 Use ZBrush's Move and Clay brushes to define the body of the shark

02 The face is the most vital aspect of the model

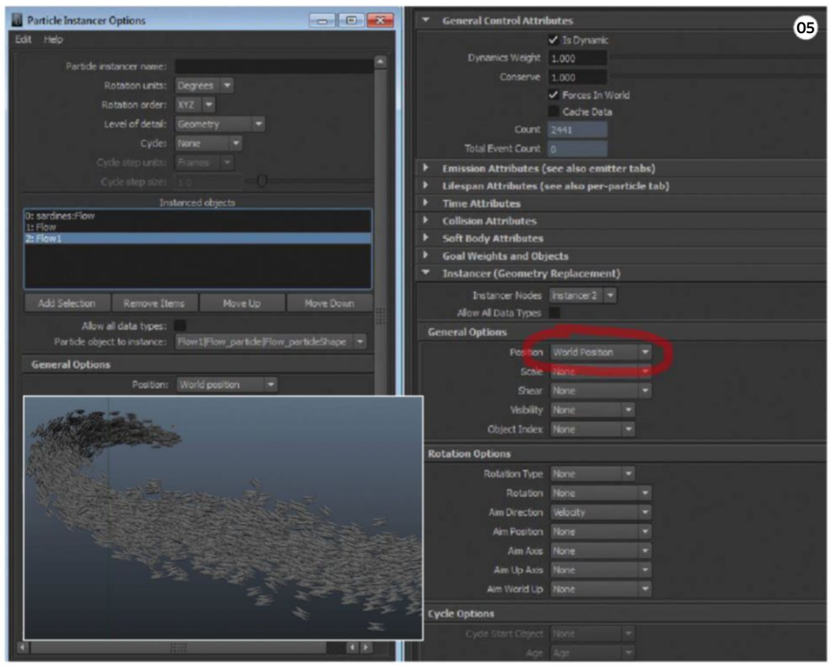
03 Apply Maya primitives to model the various elements

Work with dynamic elements

Explore Maya's Dynamics section to bring your scene to life



04 Create curve flow Go to the Effects section in Maya's Dynamics menu and click Create Curve Flow. Basically this is directional emitter, where the particles are following a path from point A to point B. With five sections of control curves, you will be able to make certain points with wider diameters – where the fish can fill the space more – as well as some areas where the stream is thinner, so smaller amounts can pass. Set Control Resolution to -6, Manipulator Resolution to -2 and Emission Rate to - 250 to provide enough particles for the stream to look busy. You can play back and stop at around the 50th frame, so enough fish are populated all along the path of the curve.



05 Replace the particles with an instancer Go to Particles>Instancer (Replacement), select the low-poly fish objects, as well as the particle shape, and press Create to replace the particles with the fish models. Set the Maya Playback Speed to play every frame and press the Play button to see how the fish will swim through the curve. Now you can change the diameters of the circles, as well as alter the positions of the vertex points of the curve to form the desired path for the composition of the image. With the Flow_ particleShape node selected, go to the General Options and set Position to World Position. Then under Rotation Options, set Aim Direction to Velocity. This will secure the school of fish are facing correctly along the path.

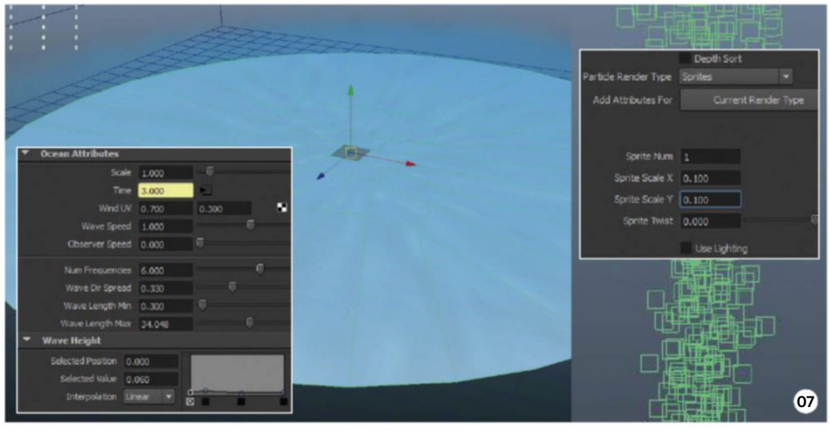
06 Model the plankton in the water A tiny but very essential part of any underwater scene is the clouds of plankton that inhabit the oceans. Even on the most clear days, there are lots of small particles swimming around. You can use the Particles menu under Dynamics to create an Omni emitter with a particle cloud shape (Clouds (s/w)). Make the Radius pretty small, around 0.003. With a rate of 100 particles/sec, you can playback and stop at the 50th frame again to leave enough plankton particles for the scene.

04 Maya's Dynamics menu is very intuitive when it comes to populating a scene

05 Play with general options of the Instancer to achieve quality results

06 By using Omni emitters, we can distribute plankton particles in the scene

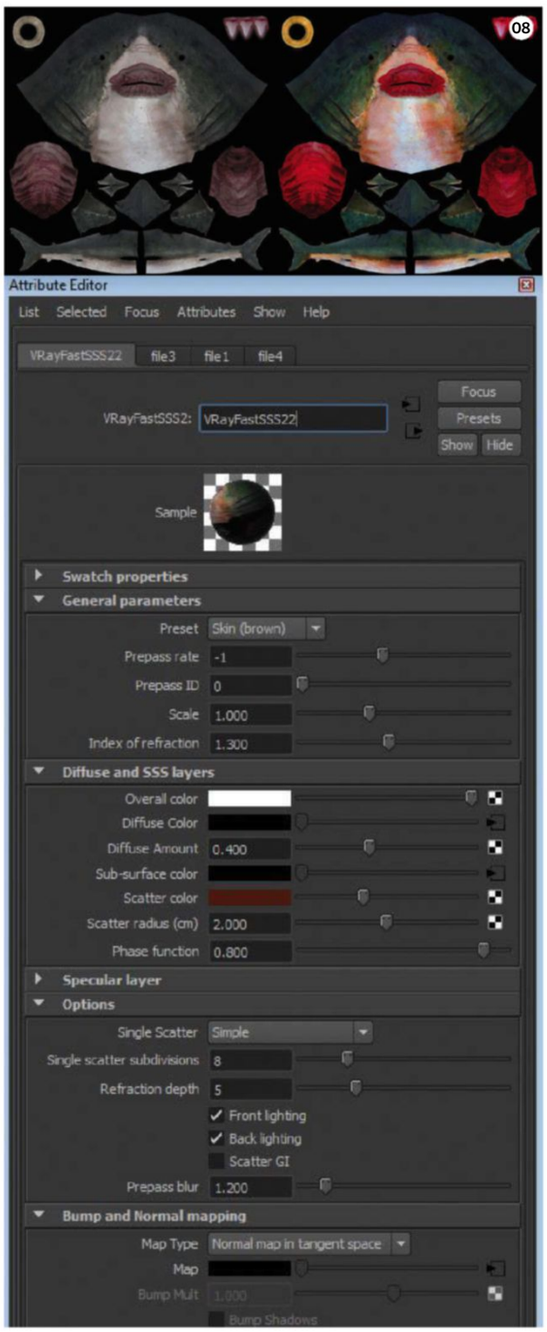
07 Maya Paint Effects is just one way you can create realistic bubble elements



07 Make an ocean surface and bubbles One of the best modules in Maya is Fluids. Go to the Visor tab and choose one of the Ocean Examples, such as Normal Sea. This will create an Infinity plane with an Ocean shader attached to it. You can tweak the settings for the Scale to fit the measurements of your scene. Later you will need to render the ocean as a separate pass using mental ray or Maya software, as V-Ray does not currently support the Maya Ocean shader. There are two simple ways to produce the bubbles. Firstly, you can create a Directional emitter with a Spread of 0.058 and a Rate of 100 particles/sec. For the shape, use Sprites with a Scale of 0.1. You can use a simple bubble image with an Alpha channel for the bubble. The second method is to use Maya Paint Effects, where there are presets for making bubbles in General Editors>Visor>Underwater>Bubbles.

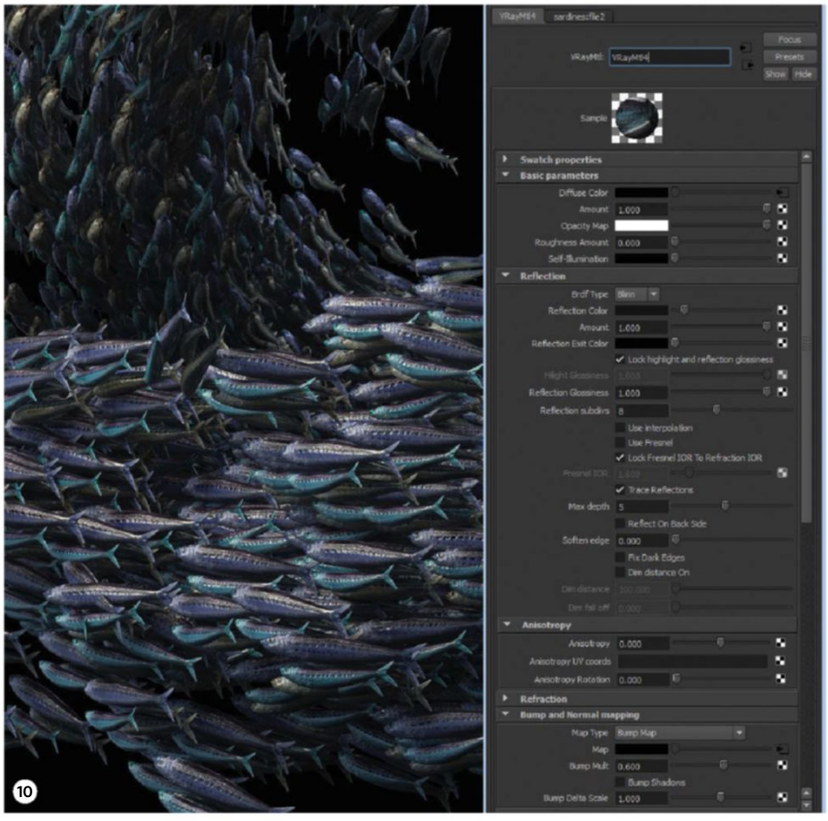
Apply materials and shaders

Prepare the basic and advanced materials for your scene



08 Texture the shark model Choose a VRayBlendMtl for the shark and the VRayFastSSS for the base material. It isn't compulsory to use an SSS, however, so feel free to experiment with basic VRayMtls, along with Maya Blinn material. We're simply using the VRayFastSSS because it produces the best results for this scene. We'll intentionally make the scatter colour very red, as this colour will begin to disappear underwater within a depth of five meters. If we go to ten meters, there will be no red at all, but because this is an artwork we can still give it a slightly red tint. For the Diffuse Color we'll use the texture as it is with a Diffuse Amount of 0.4, but for Sub-surface Color you can make the texture much more saturated with clearly saturated reddish parts around the tummy and the mouth. Also try setting the Scatter Radius to 2.5 to exaggerate the effect a little more.

09 Add Bump and Reflection maps Use a normal Bump map to establish some thinner details. For the second layer of the VRayBlendMtl, use a VRayMtl with a black diffuse colour, a small amount of Reflection and a Highlight Glossiness of around 0.846. This layer will help replicate the feel of wet tissue. For the teeth material, again use an SS shader with a marble preset, some reddish tint for Sub-surface Color and an orange Scatter tone. Make sure the Scatter Radius is pretty small. The eyes are easy to create, as they are just reflected black surfaces with a high reflectivity applied to them.



10 Detail the small fish and corals For these parts we'll use just a VRayMtl, not an SSS, to save rendering time. Make the Bump setting big, such as 0.8 or 1, and add slight reflectivity. Use the same type of material for the corals, without the reflectivity, and apply a very high Bump setting, as the corals will be far away, making the bump nearly invisible.

08 You can try other methods, but VRayBlendMtls on the shark model, as well as the VRayFastSSS for the base material, works best

09 Use Bump and Reflection maps to get the wet effect

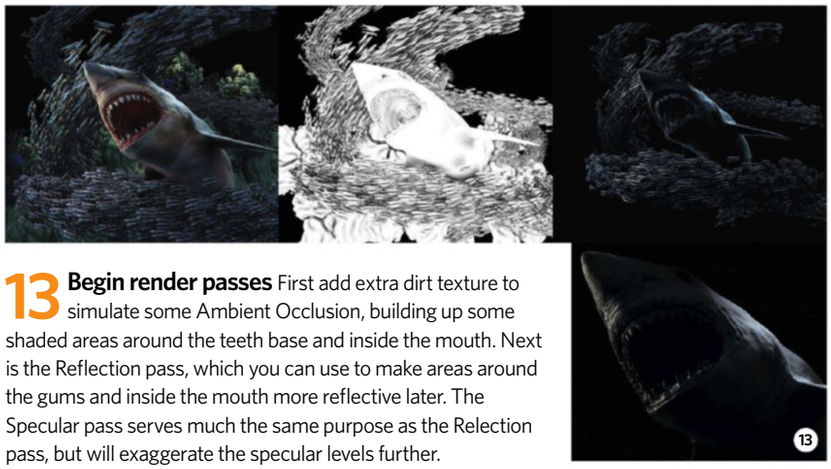
10 Texture the other elements, such as the school of fish

Light and render

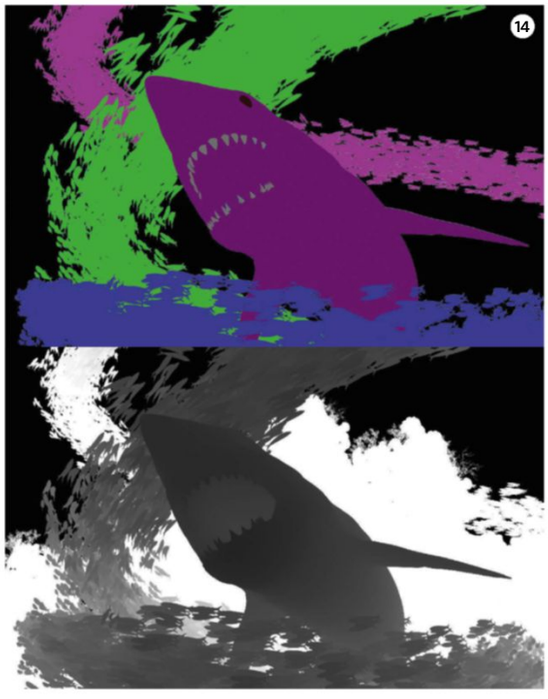
Prepare lights and render passes

11 Move to V-Ray Applying a V-Ray dome light can achieve an overall bluish atmosphere. Setting a low Intensity of 0.4 can give the feeling of the dimmed underwater mood we're looking for. Add two rectangular lights to brighten the shark with bluish tints and a white tint along both sides of the nose. The top one (Intensity 40) simulates the Sun light over the ocean surface, while the left one is more like a video light (Intensity 20). Light the corals behind with four more lights. This makes the tips of the corals much brighter than the lower parts.

12 Adjust the lights Now turn on Global Illumination, putting the Primary bounces on the Irradiance map and Secondary bounces on the Light cash with relatively small subdivisions (500). This is because, in this scene, we don't need such well-defined thin shadows. If you want to use real caustics, with rays emitting from the rectangular Sun light, this next part will be tricky. The huge numbers of small fish involved would be almost impossible to render, but there's a trick. Make a Directional light and project a Procedural Noise texture on the Color attribute. Now apply a white Lambert material to all the objects to achieve the caustic pass, which we'll later use for compositing. Make sure you render the ocean separately from the rest of the scene, as V-Ray currently doesn't support the Maya Ocean shader.

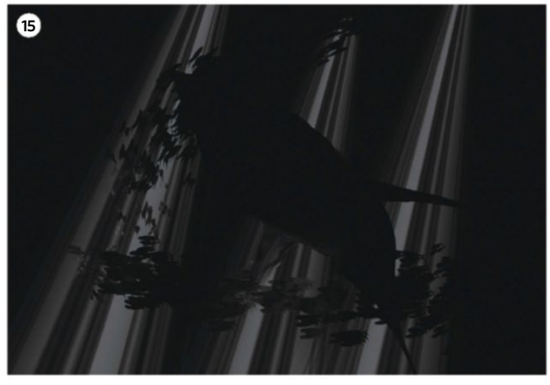


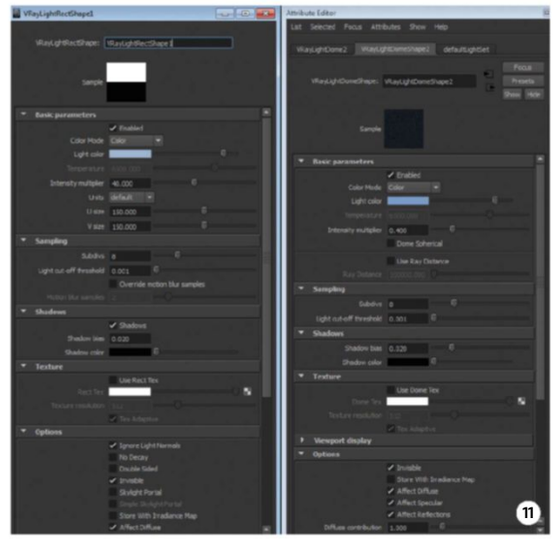
13 Begin render passes First add extra dirt texture to simulate some Ambient Occlusion, building up some shaded areas around the teeth base and inside the mouth. Next is the Reflection pass, which you can use to make areas around the gums and inside the mouth more reflective later. The Specular pass serves much the same purpose as the Relection pass, but will exaggerate the specular levels further.

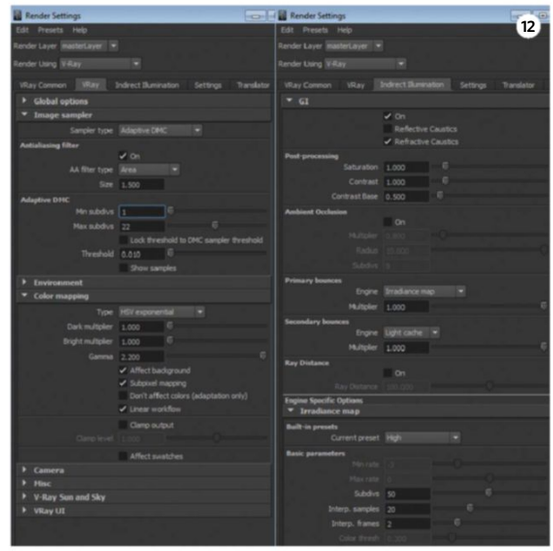


14 Make the final passes The RenderID pass is needed to gain access to the different parts of the image. If you want to make certain rocks or the teeth a slightly different tint, you can Chroma Key it, create an Alpha and use this for correcting these parts in the compositing stage. The Z-Depth pass is used for achieving volume or depth in your image. This will make some parts of the scene seem foggy, which is very normal for underwater scenes. Visibility in water normally only extends to between 5 to 20 meters.

15 Apply Sun rays To produce the rays coming from the Sun light, you can use a separate pass with Spot lights. For the Color and Intensity attributes, apply a Procedural Noise texture and turn on the Fog setting. Also activate Shadow for some added atmosphere.







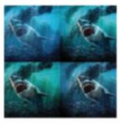
11 Start setting up the lighting with a V-Ray dome light and rectangular lights

12 Effective use of Global Illumination is the best way to achieve the right atmosphere

13 A bit of dirt texture will produce ambient occlusion in the teeth and mouth area

14 You can produce authentic depth of field with the Z-Depth render pass

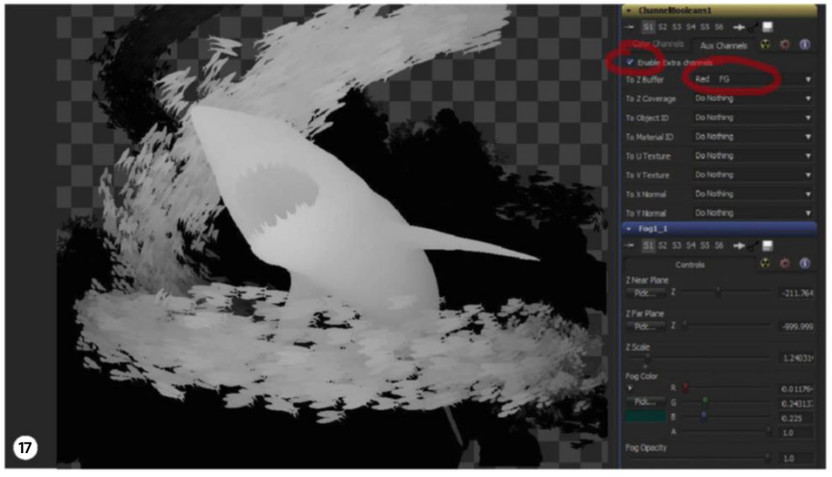
15 A Spot light can be used to produce the Sun rays



Unify the scene

Composite your layers and elements

16 Merge the layers We'll be using Digital Fusion to composite the different passes. Create a blue gradient that's darker at the bottom and brighter at the top. Next add the water surface and apply a Polygon Mask to it, with large Feather setting. Add the shark, fish and corals, then multiply these with an AO pass on top and a small Transparency setting. Compose the caustic layer on Hard Light mode and use Luma keys to take the darks from the Alpha out of the image. Merge the Reflection pass on-screen with a 0.3 Blend and the Specular pass on 0.3.



17 Use the Z-Depth pass Apply the Channel Boolean tool to add the Z-Depth to the Z channel, so that you can use the Fog and Depth Blur tools. Apply a couple of fog layers with different tones to match the lower dark layers of the water. Compose the rays on Screen mode, as well as all the particles and bubbles. Apply Directional Blur on some parts of the fish and the tail of the shark to simulate movement. Every diver wants to swim in clear blue water, but most of the time the ocean is very murky and greenish, so experiment with different levels of shadow and green contrast to achieve the final look.

16 Move to Digital Fusion to composite the piece together

17 Tweaking the water to be murky and forboding will finish off the result nicely

More dimensions

Always try to use a combination of 2D and 3D programs. Hugely beneficial changes can be made in the compositing stage, rather than trying to achieve everything in 3D. It can also save time when fine-tuning the results.

Artist showcase

Iliya Atanasov

Iliya is a 36-year-old Bulgarian CG artist. He has worked for TV channels, advertisement agencies, film companies and videogame studios. He currently works for Pixelhunters, which is based in Dubai, UAE. The studio mainly focuses on videogame cinematics.

Smilyan House **Maya, Digital Fusion (2008)**
This scene required some hard-surface modelling, as well as Maya's Paint Effects for the lush greenery. IBL lighting in mental ray was also applied to finish things off

Alien Swamp **Maya, Digital Fusion (2009)**
Another hard-surface modelling piece that again used Maya's Paint Effects for the foliage. Lighting has been used in unique ways to achieve a simultaneously drab and homely scene

Maldives **Maya, Digital Fusion (2012)**
This made great use of displacement materials and Maya's Paint Effects. The wooden structures and the epic clouds combine to produce a pleasing composition

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: www.3dartistonline.com/files

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Artist info

Neil Maccormack

Website www.bearfootfilms.com
Country Switzerland
Software used LightWave, Photoshop
Bio Neil is a freelance 3D and concept artist originally from the UK but now based in Switzerland

“I used some custom Clip maps to give the robot a half-built, half-decayed look. These maps remove some of the object geometry in the render, giving the impression that the robot is still being constructed or salvaged. I then painted in some extra highlights and patches in Photoshop to make it seem as though the sun is shining through the robot, which I think adds to the scale”

Software used in this piece

LightWave Photoshop

Rebuild 2013

This image came out of reusing an older model I had created some time ago but never found the right piece to use it. I wanted to create something large-scale and futuristic, but at the same time have something that people could believe was real. I also wanted to give the image a 2D feel so I did quite a lot of hand-painting and retouching in Photoshop after creating the 3D scene in LightWave.

Step by step
Easy-to-follow guides take you from concept to the final render

Artist info

Benjamin Brosdau

Personal portfolio site www.benjaminbrosdau.com
Country Germany
Software used Maxwell Render, 3ds Max
Expertise Benjamin has been using CG for over a decade and specialises in lighting

Render glass objects

Ajax 2013

"Learn to render in a minimalistic environment to showcase a range of transparent and translucent types of materials"

Benjamin Brosdau lives and works in Berlin. He is the technical director for Pure Rendering

Here we will discuss the various aspects of shading, lighting and rendering a glass Greek bust with Maxwell Render. We'll be using a variety of different transparent and translucent materials to produce the most realistic result possible.

There are a number of important aspects to keep in mind when setting up the scene, such as keeping an eye on the correct scene scale and using realistic values for the camera. Moving on we'll briefly go over the few objects that the scene consists of, before placing the first light sources and working on the shaders for the bust.

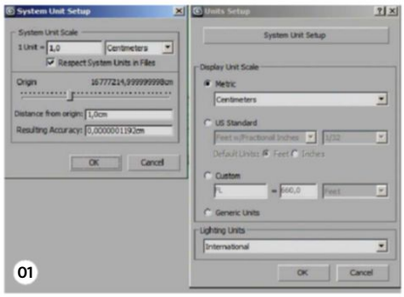
The goal here is to layer crystal glass over the tinted and sandblasted materials, then finally build the required shader structure for a material made to resemble translucent jade. The settings for the final rendering output, and some quick tips on cutting down render times, will be discussed last.

Notes on realistic scale and cameras

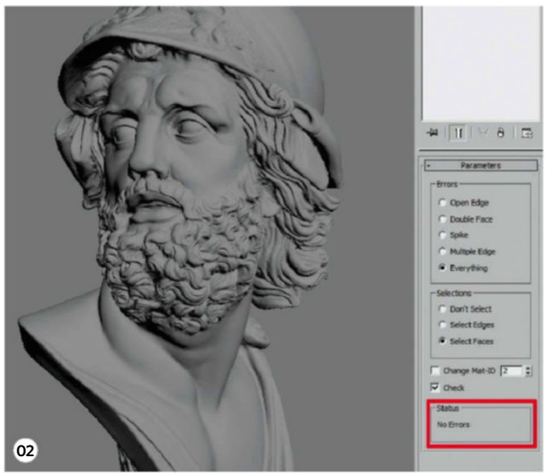
When working on projects such as this, it's of great importance that you use realistic sizes, since they'll provide values that we can easily relate to in the real world. This is especially true when working in Maxwell Render. With regards to camera settings, Maxwell uses a camera model with values that can also be found on a real camera. Here, an Aperture of 11 was used to provide a greater depth of field, with the Shutter Speed and ISO (film sensitivity) also set to realistic values. However, in theory these can be set to anything you want – for a still image at least – so long as the result looks correct and believable.

Prepare the scene

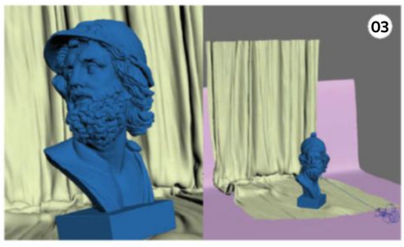
Set up the measurements and units



01 Establish your scale First we need to check that we're working inside a plausible unit system. In this case we'll be using a centimetre-based system (cm). Inside the Maxwell Material Systems we will need to input different values in cm, so having things matched up will help simplify and streamline the process.



02 Import and check the geometry As it's a highly detailed object, the bust has a very dense mesh, which results in a high poly count. Maxwell relies on closed surfaces for faithful reproduction of translucent (SSS) materials, so an STL Check modifier should be applied immediately after importing. Scale the figure to be around 50cm tall to make it roughly human size. Don't forget to reset the scale afterwards (Hierarchy> Reset>Scale) so modifiers like UVW Map will show the correct results.



01 Setting the preferences inside 3ds Max

02 Applying an STL Check modifier detects no errors, so the model is in good shape

03 The general layout of the bust

03 Add surroundings and camera After merging the surroundings – a sweep background and a set of nicely folded drapes – it's time to search for a good angle. This is of course a matter of personal taste, but in this case a slightly lower angle seems preferable, since it gives the bust a dramatic appearance. Maxwell makes use of the standard 3ds Max camera, so no special type of camera is required. Here we've settled on a Focal Length of 85mm, which is a classical portrait focal length. The camera's target, and therefore plane of focus, is placed directly on the bust's eyeball. Common values from a photographic standpoint apply in Maxwell as well, so an Aperture of 11, along with a Shutter Speed of 1/250s at an ISO of 200, present realistic values.

Concept

The concept is based on a classical Greek bust of Ajax, a mythological Greek hero. The 3D scan used for the model was kindly provided by Torolf Sauerman (**www.evolution-of-genius.de**).

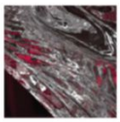
Learn how to

- ☑ Set up your scene with Maxwell Render
- ☑ Prepare geometry/objects for proper rendering with translucent materials
- ☑ Light and shade transparent objects using various effects
- ☑ Set up multi-layered shaders in Maxwell Render
- ☑ Use the Multilight feature to speed up the lighting process

With the Disc

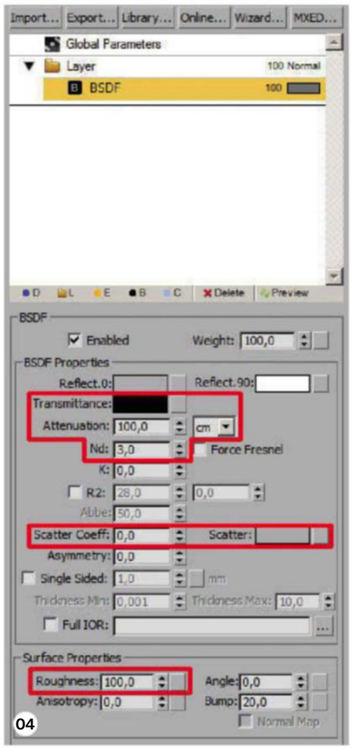
Tutorial files:

- MAX 2012 file with all models shaders and textures
- HDR file to accurately match the scene



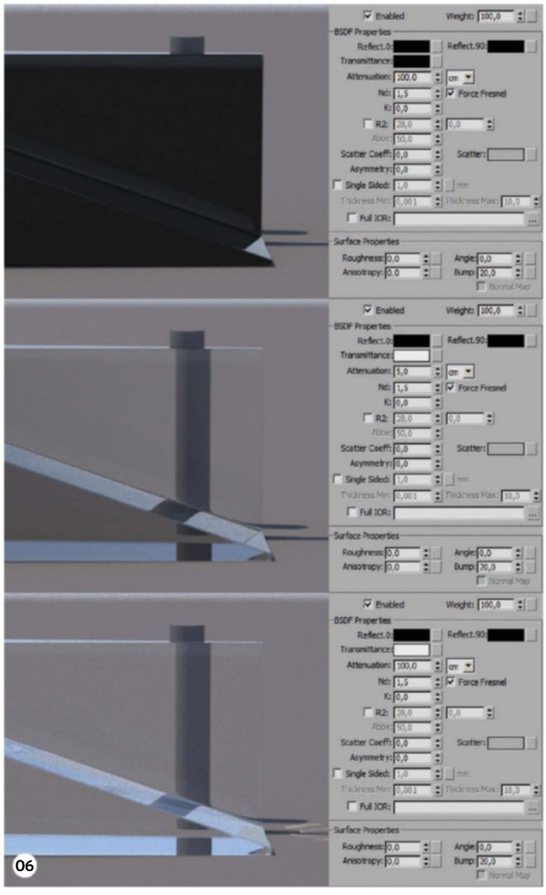
Use shaders and create light sources

Apply the initial shaders and develop the lighting environment



04 The Maxwell Material philosophy Contrary to traditional render engines, it's important to understand that Maxwell uses a concept that relies exclusively on the assumption that all light is either reflected or refracted. As you can see, there's no Diffuse or Specular colour options. If you see a red sphere, it's because red is being reflected back into our eyes. The settings are plentiful, but in this tutorial we'll pay our closest attention to the Transmittance and Attenuation settings (the ability to let light through); the Nd value, which can be regarded as the IOR; and of course the Scattering and Roughness parameters.

05 Produce a HDR environment It's preferable to start working with a HDR lighting system on a diffuse surface, to be quickly able to gauge light intensities and angles. Don't forget to set the standard Environment Type to None. Usually we'll add light sources (emitters) to boost particular features on a model or scene. Adding a HDR dome light is very easy in Maxwell; just go to Image Based under the Environment tab and you'll see the different options available to you. Here we've used a HDR (included with the issue) depicting a studio light setup and made sure all the channels use the same file by leaving the Use Background checkbox ticked. With the Intensity set to 4, and a default material applied to all objects, we can start our first rendering. Notice how we didn't need to input any values for the render setup whatsoever.



06 Specific settings for the glass Firstly we're looking for a crystal glass effect, so to do this we need to alter various settings in the material. Mainly we're looking after four settings that will control the appearance of the glass: Transmittance, Attenuation, Nd value and Roughness. The test object has varying thicknesses to show the effects. Note how both Reflect slots are set to black but Force Fresnel is checked. This way we can make sure that the Fresnel curve is accurately driven by the Nd value alone, instead of the colour selectors.

07 Make changes to the sculpture After adjusting the Maxwell Material and its various settings for the glass, we can start applying the shader to the sculpture and hit Render. Although we haven't discussed any materials other than the glass itself, these are all are supplied with this issue and are ready to use in your own project.

04 The Maxwell Material with default settings

05 The result of the first render

06 Settings and their effect on the look of the material

07 The first serious test render using a clear crystal glass on the sculpture

08 Add emitters and Multilight

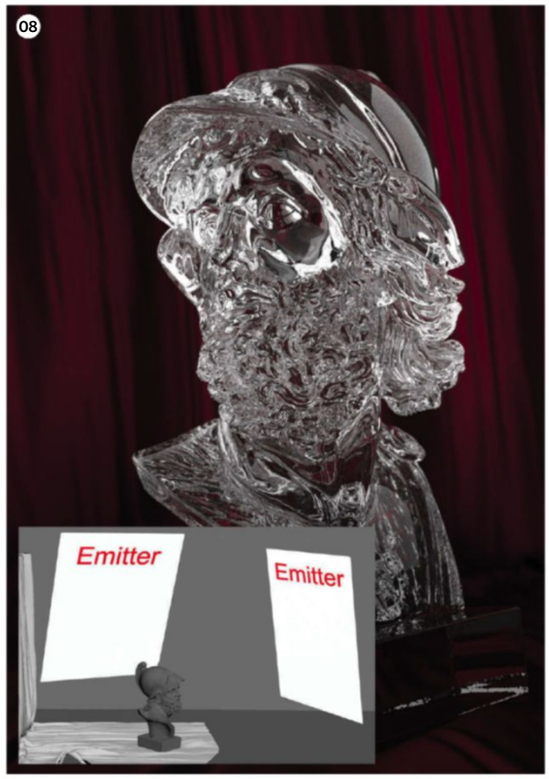
The look of the HDR image alone seems alright, but certain areas still need more definition and contrast, especially considering the goal of a jade-like material. Emitters in Maxwell are geometric objects (such as planes, but they can be anything) to which an emissive material has been applied. Here we decided on a light from behind and to the right of the camera, as well as another one to the far right, which acts as a sort of rim light. By enabling the Multilight option in the general settings, we are able to control the intensity of the emitters during or after the rendering.

Render the surfaces

Having worked with highly reflective and refractive objects, it becomes obvious that we actually cannot light those surfaces, but rather they are defined by their reflections and refractions. In much the same way that you can't light a chrome sphere, you can only place objects that show up as reflections. The more diffuse a surface becomes, the easier it is to read the contours, which is the main reason why we split up the bust into two sections. Using a plain and simple background for glass objects is always a good idea, to keep strange and hard-to-read refractions to a minimum.

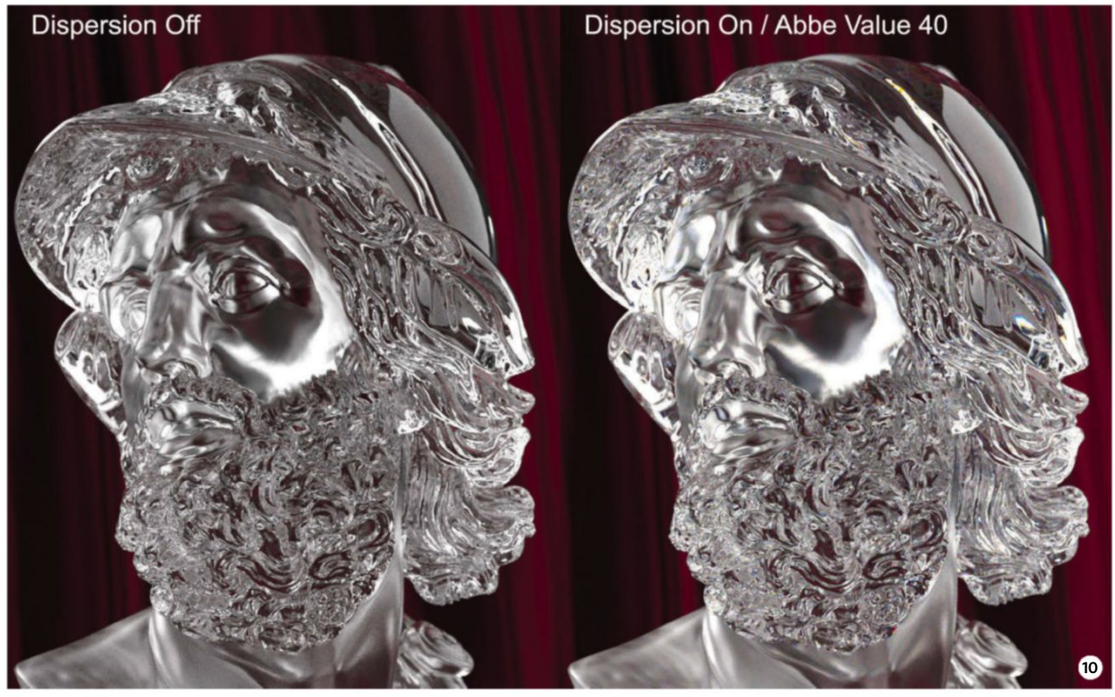
09 Separate sections for different shaders

The effects of additional emitters and using the Multilight function are clear steps forward, but due to the busy nature of the sculpture, it's still a little hard to read. To solve this problem, we'll select the polygons that make up the face, neck and base, then apply a duplicate of the glass material to them. The only thing we'll change in this material is setting the Roughness to around 15-20 to give it a frosted appearance. Now the rays will be diffused more evenly and we can read the facial features with less effort.



10 Finalise the crystal glass

So far we have dealt with a perfect kind of material without any flaws. This is easily achievable in CG, but in reality nothing is ever perfect, so we can add some extra realism if we introduce an effect called dispersion. Light consists of different wavelengths and it so happens that refractive materials will split these wavelengths into visible colours, much like a prism will do. High-quality glass will actually reveal very little of this effect, but it's there. The setting to adjust this feature is called the Abbe number. Anything between 25 and 60 is a realistic value. The lower the value, the more pronounced the effect becomes.



08 Adding more emitters enables greater control over the model's definition

09 Using a rougher glass material for the face of the bust increases readability

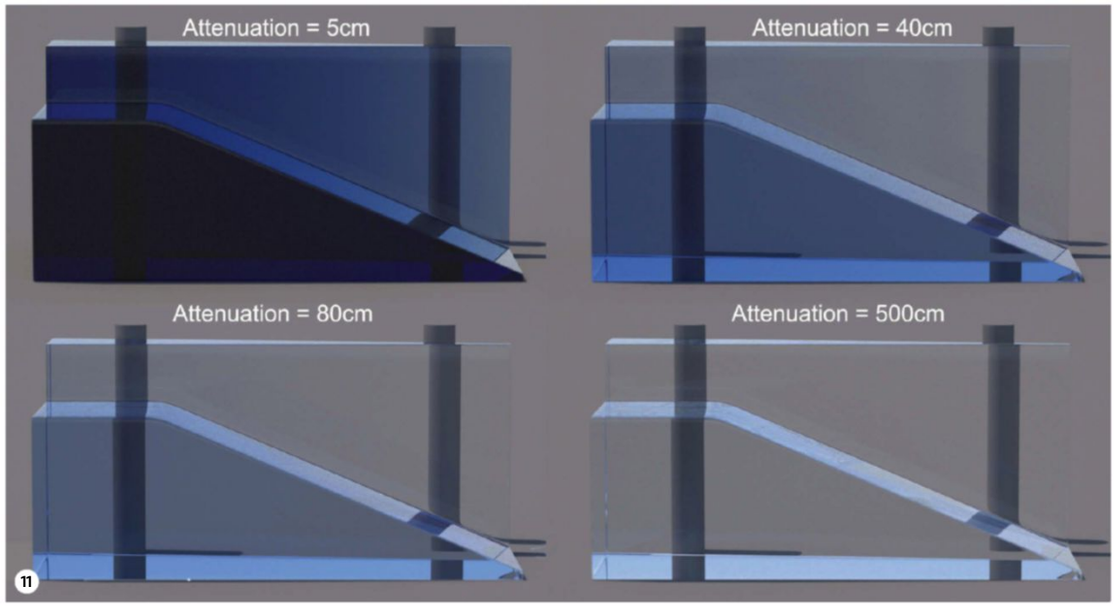
10 Adding dispersion can help sell the viewer on the believability of the shot

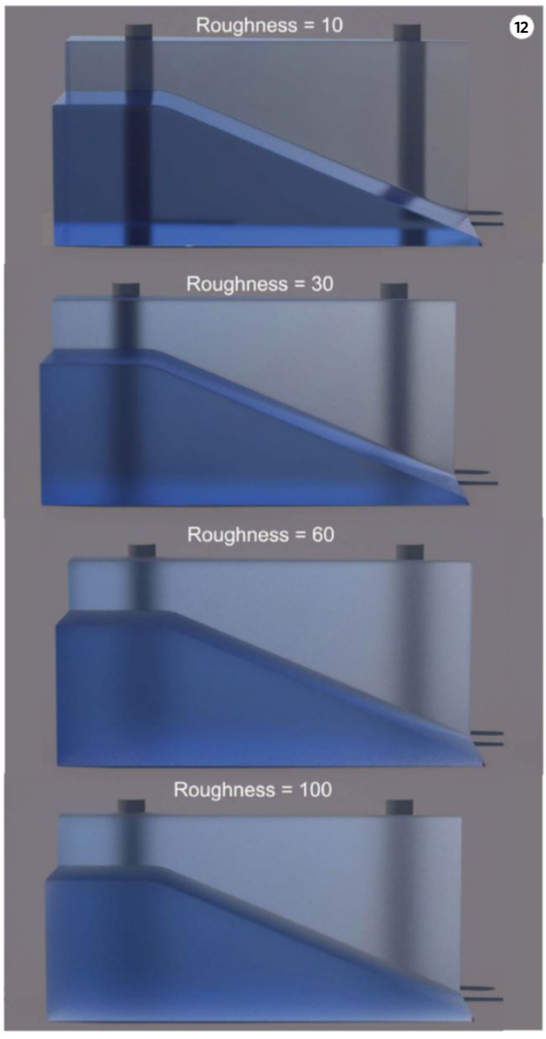
Tinted glass and frosting

Alter the look of the sculpture with advanced shading effects

11 Transmittance and Attenuation

So far we've covered transparent glass but have only brushed over settings for controlling a sandblasted or tinted look. For a tinted result we'll change the transmission colour, though it's best to avoid a full numerical value of 255 in any of the settings. We don't need to give it any kind of reflective quality, since the colour is coming from within the object. The Attenuation Distance controls how far a ray can penetrate an object until it's lost half of its energy. This means a high Attenuation Distance looks lighter and less colourful.





12 Produce a sandblasted look

Creating a frosted or sandblasted look is easily achieved by increasing the Roughness of the material. The higher the Roughness, the more diffuse the look. Typically values vary between 10 and 30 but in some cases a higher value can help to decrease render times.

13 Make the most of the features

By applying the previously mentioned settings on the actual sculpture, we can reveal some very nice results. Since the richness of the colour is controlled by how deep a ray can penetrate a surface, the various angles and features on the bust create a wide range of different colours on the surface. In this example we settled on a Roughness of 25, an orange transmission colour and an Attenuation Distance of 30cm.

Glass effects

Frosted glass can exhibit a very interesting aesthetic, especially when combined with colourful attenuation. Moreover, the effect is easy to achieve and looks sophisticated in arch vis scenes. During a production, corners are often cut to reduce the rendering time associated with frosted glass.

11 Gradually increasing the Attenuation Distance setting while maintaining the transmission colour

12 Slowly increasing the Roughness changes the look, which will become increasingly opaque

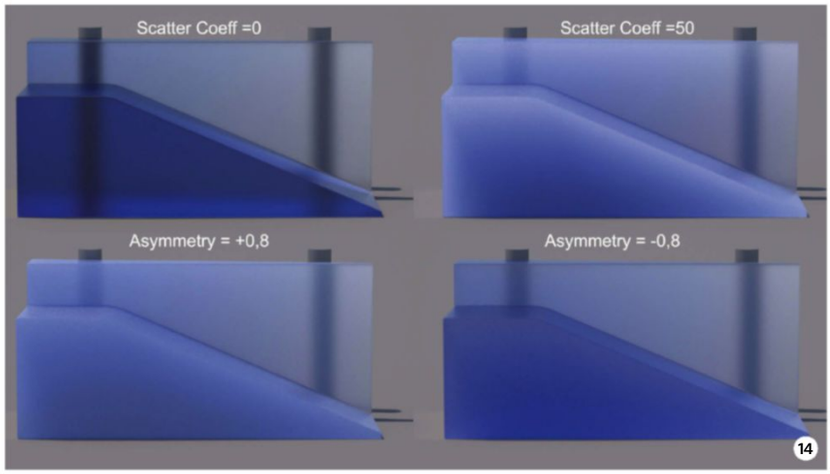
13 This is an example of using a reddish type of tinted and sandblasted glass

14 The effects of altering the Scattering Coefficient and Asymmetry settings

15 The effect of scattering on the left and scattering with coating on the right

Replicate a jade effect

Create a shader that resembles jade



14 Adjust Scattering and Asymmetry A few more settings are required to control the effect of translucency, particularly in the Scattering Coefficient and the Scattering Asymmetry options. By increasing the Scattering to anything above 0, we can start to introduce more and more particles inside the volume that the rays can interact with and change direction, giving a translucent effect. An Asymmetry setting of 0 means that a ray has an equal possibility to be directed in any direction; a positive value increases the likeliness of a ray coming back out of the volume, giving a brighter, denser look, while a negative value does the opposite.

15 Translucency and coatings After we've created a nice translucent base material for the sculpture, we are obviously missing the reflections on the surface that are typically associated with jade, since it's most often polished. This is where the coatings come into play. Adding a coating creates a very thin transparent and reflective layer above our scattering material, giving the impression of a very shiny surface. We can control the reflection's intensity with the Nd number. For this example we want to bring the Thickness way up to avoid colour shifting in the coating.

Artist showcase

Benjamin Brosdau

Having spent more than 12 years in the field of computer visualisation, I have gathered a wide set of skills, although I specialise in the field of arch vis and photorealism in general. Over the years a lot of my works have been published and awarded prizes in many places, such as the CG Choice Gallery or Ballistic Publishing's *Exposé* books.

Chesterfield Project Glassware **3ds Max, Maxwell Render (2010)**
A detailed close-up view of the props created for the Chesterfield project I worked on. It features a clear crystal glass with mapped sandblasted decorations

Matrix Kitchen **3ds Max, Maxwell Render (2010)**
This is a personal project of a photorealistic kitchen, created using Maxwell Render and 3ds Max

Glassware **3ds Max, Maxwell Render (2009)**
A personal project dedicated to product shot renderings. Props such as these are ideal for arch vis

Refine the realism

Tweak scattering and transmittance to bring out even more detail

16 Layer multiple BSDFs using maps We have the basic jade aesthetic at this stage, but we're still missing variation across the surface. To add this we need to determine the transmittance with a simple map created in Photoshop. To go one step further we'll create another BSDF with the exact same settings above our first one, except for the fact that we'll use slightly offset values for the Scattering and Transmittance. You can also control the visibility of this effect by mapping the opacity of the second BSDF with a black-and-white map, resembling some loose cloudy shapes. This ensures that we can see the second BSDF only in certain places.

17 Finalise the look We are basically done at this point, but just need to set off the final render in the desired resolution, as well as set a time or Sampling Level limit. Don't forget to leave Multilight enabled and hit the Render button. Now you can take a break until the render has finished. Once in Photoshop we can work on the contrast a little more and sharpen the image to finish.

Notes on translucent objects

Using the various settings that are available, it's possible to create almost any kind of solid translucent material while maintaining a very realistic look. The key is to only adjust one setting at a time and remain firmly within the realms of plausibility. As you might have noticed, translucent materials can be very slow to render depending on the settings. It's therefore a good idea to keep an eye on the benchmark on your machine to arrive at a good solution. As a rule of thumb, the more diffuse a surface is, the faster it will render when you're finished.

16 Using two map-controlled BSDFs creates more details

17 The final look of the jade shader on the Ajax bust

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

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Step by step
Easy-to-follow guides take you from concept to the final render

Artist info

Gavin Goulden

Personal portfolio site www.gavimage.com
Location USA
Software used Marmoset Toolbag, 3ds Max, Photoshop
Expertise Gavin's main focus is on character art for all videogame platforms

Portfolio-ready character renders

Spacegirl Portfolio Render 2013

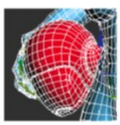
"Learn how to produce a strong portfolio piece, demonstrating current-generation capability and an in-depth grasp of character art"

Gavin Goulden is currently the lead character artist for Irrational Games, developer of *BioShock Infinite*

This issue I'll be sharing some insight into an employer's perspective of students and artists on the job-hunt, particularly regarding their online portfolios. When creating an online portfolio, it's very easy to fall prey to some common mistakes, but these steps should help you avoid them.

On the following pages you will learn the basics for choosing a pose for your character and then rendering it in a real-time environment. It's very important to display your videogame characters using this kind of rendering solution to show how your work will hold up in an actual game. Marmoset Toolbag, which is a very affordable and easy-to-use alternative to mainstream game engines, is designed to do just that. Along with the technical aspects of this tutorial, I will also share some insights that may help you weed out weaker pieces of your portfolio and make smarter decisions for what type of work to display.

To detail this process I will be using the Spacegirl asset that you may have seen in previous issues of 3D Artist. This will provide a solid model to follow the essential process of selecting a pose, rendering in Marmoset and completing final touches within Photoshop.



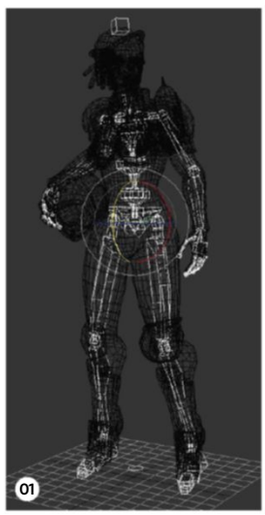
Pose your character

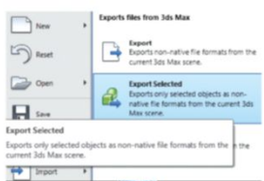
Pick the most effective position

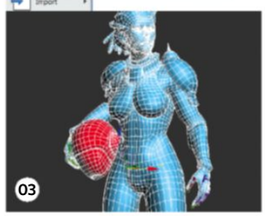
01 Apply a biped rig 3ds Max has an easy-to-use preset biped rig that can be applied to your characters. Once the rig has been added, and the mesh has been skinned to the skeleton properly, you can rotate the bones within the rig to begin posing. Generally I like to set up multiple poses within an animation set, essentially keeping the very first frame as the bind pose, then storing separate poses at different keys along the timeline. This helps to keep things clean and enables you to quickly alternate between poses to see which one works best.

02 Choose a pose Always keep your audience in mind when selecting a position for your character. Anything that will become confusing, distort your model, or obstruct any of your work can become a problem. The intention here is to show extra effort by dropping your character out of a bind pose and into something more natural.

03 Export to Marmoset Getting your models from 3ds Max to Marmoset is easy. For a start Marmoset deals in chunks, which means that each separate model in 3ds Max will translate to a separate material in-game. This is useful if you want parts of the model to have different properties from one another. When exporting, both OBJ and FBX formats work fine, but I prefer to use FBX as it generally produces less problems regarding file corruption. By default, Marmoset will automatically update the model in the viewport if you write over it.







Legibility versus action

When adjusting your characters for a portfolio, you may be inclined to give them a pose that conveys an extreme action. While this may give your work more visual impact (suitable for the cover of a comic book, for instance), it can also distort your model in unflattering ways. On top of this, choosing a pose that hides elements of your character can be misleading to your viewer, especially when they're a potential employer. Keep it simple and pick a pose that suits your character but doesn't become the focus of the piece.

01 You can use 3ds Max's biped rig to quickly create a pose for your character

02 Choose a pose that doesn't distort or obstruct your model

03 Select all of the chunks of your model and export it as an FBX

With the Disc

Tutorial files:

- Spacegirl textures (Diff, Norm, Spec, Glow)
- Helmet textures (Diff, Norm, Spec, Glow)
- A posed FBX file
- The Marmoset scene
- Marmoset materials
- Tutorial screenshots

Learn how to

- ☑ Properly display your creative work in a portfolio for potential employers
- ☑ Render your model in a real-time environment

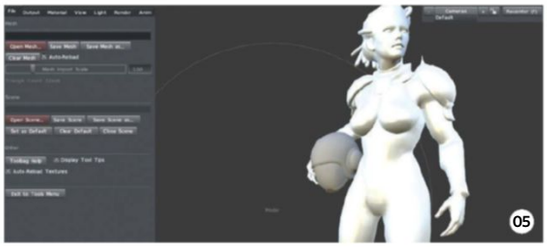
Concept

The Spacegirl character nods to retro science-fiction art but is still accessible to a modern audience. Here we'll focus on the rendering techniques used to finish the piece.

Open Marmoset Toolbag

Find a quick solution for achieving real-time renders

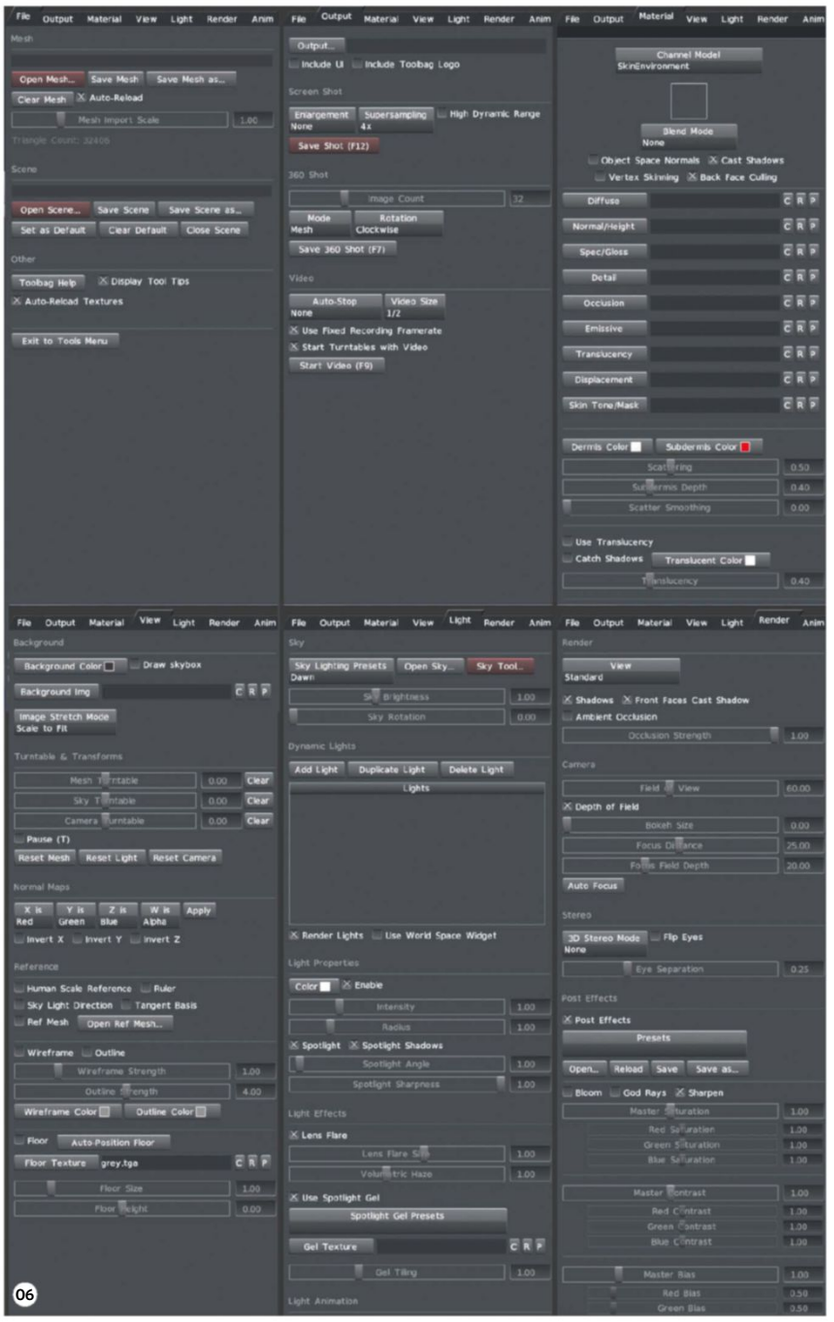
04 Import your character Once you've properly split up your model within 3ds Max, you can bring it into Marmoset by navigating to File and selecting the Open Mesh option. Notice the Auto-Reload option, which will refresh the model in the viewport if you were to re-export it from 3ds Max.



05 Navigate the viewport Marmoset has a unique navigation system that sets it apart from its counterparts. By holding down Shift and clicking the left mouse button, you can control the light source of your scene, which is based on the Sun's position in your skybox. Hitting Alt will access the camera controls, not unlike a 3D application. Holding Alt and left-clicking will orbit around the camera's focal point. The middle mouse button pans and the right mouse button zooms in and out. By hitting Ctrl you can access the model level. Hold Ctrl and left-click to rotate the model or click the middle mouse button to translate it. These operations can be reset in the View tab and all navigation commands create a pop-up in the viewport, telling you which mode you're in.

06 Learn the UI Marmoset is broken up into different portions for specific purposes, with each of the tabs at the top-left revealing a suite of options. File enables you to open and save files; Output has information on where information is saved; Material has all of the shader properties; View holds all the options for your viewport, including background settings and how the model itself is displayed. The Light tab enables you to select different skyboxes and set up point lights. The Render tab houses all of the post-processing effects and camera controls. Towards the top-right of Marmoset you can select saved camera positions and lock your viewport.

07 Create a material Marmoset automatically applies a default material on all of the models that are imported, just like any 3D application. To create a new material, simply click on New Mat..., set the name of the file and where you would like the materials to be saved. If you click on Save Mesh & Materials at any time it will save your model, your materials and the material application to those models. To apply a material to your model, grab it in the menu with a material selected and click Apply Selected Material.



08 Adjust your viewport settings It's important to note that, depending on how your Normal map was generated, you may need to adjust the settings for how Normal maps are displayed in Marmoset. Specifically, if your Normal maps are appearing flipped, navigate to the Normal Maps section in the View tab, enable Invert Y and click Apply.

09 Tweak your material Back in the Material tab, go to the Channel Model dropdown menu, where there are multiple types of materials you can choose from. Picking a material type, such as Phong, enables different texture slots, including the usual Diffuse, Normal and Spec, as well as some other options such as Emissive and Occlusion. Simply click on the name of the texture type and navigate to the appropriate texture sheet. The Alpha channel of the Diffuse texture will control opacity for some materials. Different materials, such as skin, open up more options to play with. Within the material you can also enable Specularity – which is a must-have – and control its reflected colour, as well as the sharpness of the highlights.

The diffuse texture map, also known as the albedo or color map. The alpha channel of this map will be used by certain blend modes for compositing.
09

04 Importing your prepared character into Marmoset is simple. Simply navigate to the Open Mesh option

05 Navigation within Marmoset is unique, but easy to understand and simple to reset if you find you've strayed too far

06 Marmoset breaks down your options into different tabs, offering an intuitive and uncomplicated interface

07 To create a new material, click New Mat... and navigate to your project's location

08 Be sure to use the proper viewport settings to have correct Normal-mapping

09 Applying textures to your material is as easy as clicking on the name of the texture type and selecting the appropriate image

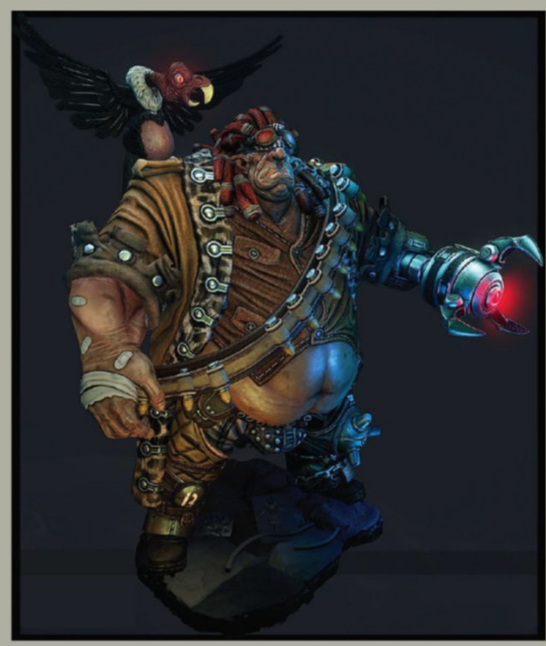
Game engines for portfolio renders

Using a game engine to display your work has multiple benefits, not least because the result will be accurate to what your employer will see in-game. Programs such as 3ds Max and Maya, while capable of displaying your work, use different solutions than Unreal, Marmoset, or CryEngine. Another benefit is that it shows your potential employer that you have a working knowledge of the game engine and are familiar with completing a game character.

Artist Showcase

Gavin Goulden

As the lead character artist at Irrational Games, I am primarily responsible for the best practises of my team, managing our schedules and creating character art for current-generation games. Prior to this, I was a character artist for Blue Castle Games/ Capcom Vancouver, where I worked on *Dead Rising 2* and *The Bigs 2*.

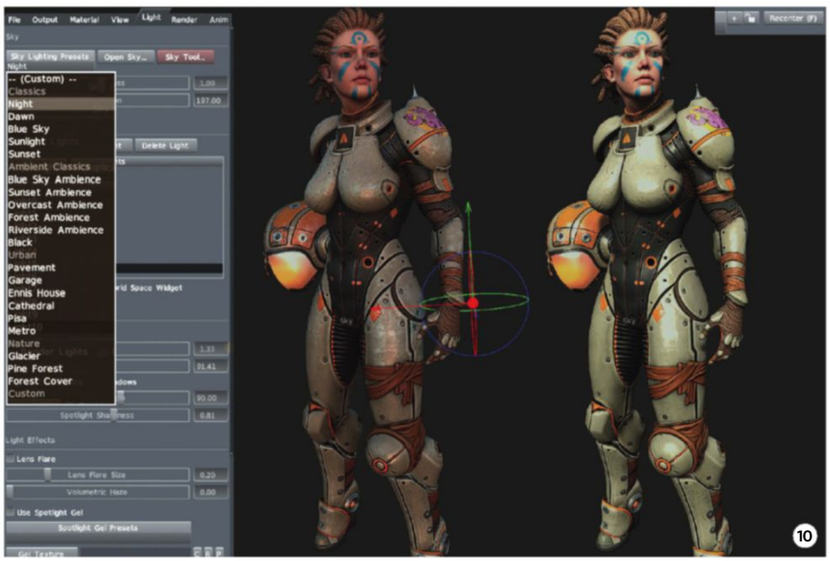


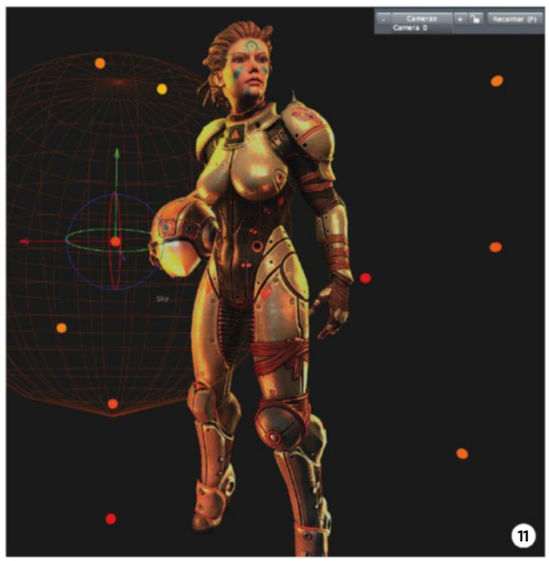
Beefheart **ZBrush, 3ds Max, Photoshop, Marmoset (2012)**
A cyberpunk-flavoured pirate gang leader created for a friendly competition over on the Polycount forums

Bishop **ZBrush, 3ds Max, Photoshop, Marmoset (2009)**
This is a character created for the Dominance War IV competition. He's a rough-around-the-edges cleric armed to the teeth with a magical gauntlet and a Gatling gun

Lighting and rendering

Choose a lighting setup that complements your character



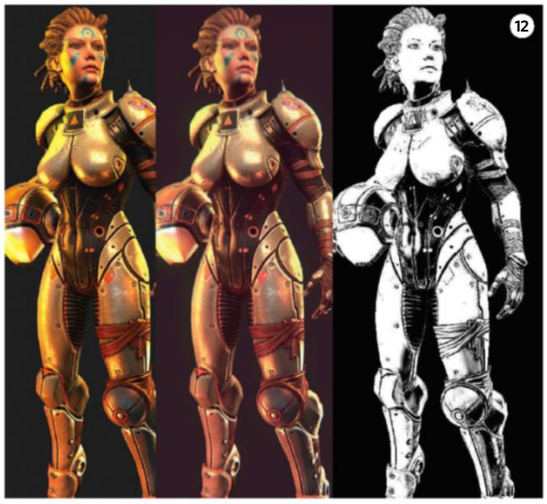


How much is too much?

When creating renders of your character for your portfolio, consider if you are straying too far from what is acceptable in a game-ready environment. For a beauty image you can throw many post-processing effects at your pieces – depth of field, screen effects and so on – but these may not be a realistic solution for in-game assets. It is very easy to go too far with such effects and present an unviable model.

Regarding the WIP images that accompany your beauty shot, these should present an unfiltered display of the piece, included for informative rather than artistic reasons.

10 Achieve ambient lighting Marmoset Toolbag uses a Sky Lighting system. Basically your light is the Sun within the skybox you select, which gives you different lighting situations, from dawn to dusk. This enables you to choose the most favourable lighting scenario for your model. The different options enable you to rely more heavily on a direct light source, such as the Sun, or even select ambient lighting that you can then fill in with point lights.



11 Use point lights You also have the option to add Dynamic lights that will be additive to the sky light setup for your scene. These lights function like Omni lights that you may be familiar with from 3D applications. Inside the Light tab, you can create lights by selecting Add Light. Within this light you're able to control the colour, radius and intensity, along with the position that can be altered in the viewport and then manipulated using the gizmos – just like in 3ds Max. For lighting, I tend to stick to an ambient sky light, then a three-point lighting setup, such as a strong back light, an orange fill light and a blue key light on the opposite side.

10 In the Light tab there are multiple presets you can use for either ambient lighting or to fully light your character

11 Adding point lights to your scene is a great way to create a three-point lighting setup

12 Post-processing effects can be tweaked in the Render menu

13 Access the View dropdown menu within the Render tab to select which type of information will be displayed on your final model

12 Post effects and filters Marmoset enables you to apply post-processing effects to your image quickly, whereas most engines would leave these options under the hood. You'll find the Bloom or Sharpening options, along with the ability to tweak these settings, are all you'll need. However, you can also adjust colour correction within the application. You'll find different presets to choose from, ranging from standard effects to a stylised Polaroid look. Play with these options or create your own by adjusting the default settings. Continue tweaking sliders to reach the best effect – but make sure to save your custom settings before you go too far.

13 Render separate images Under the Render tab you can select which sections of the model to display. This enables you to select separate elements and combine them in Photoshop. You can also enable and adjust the strength of shadows and ambient occlusion, which will show up in your final render. Setting the depth of field for your camera will bring added realism, or you can alter its field of view for tighter or wider angles to produce a more dynamic shot. To save an image, navigate to the Output tab, set how large the image should be and it's location. Hitting F12 will quickly save the image with those settings.

Post-production work

Use Photoshop to complete the piece

14 Assemble different renders With the camera position saved, you can save out separate images to combine together in Photoshop. Generally I produce an image with and without the post effects, one with the Specular information that can then be overlayed on the image to pop out cavities and highlights, and a background plate. The Alpha channel is stored within all renders, which I then extract for masks and to split the character from the background.

16 Different types of portfolio pieces When creating a character for publication in your portfolio, you should break the images down to be artistic and constructive. Produce a beauty shot, a turnaround image showing multiple angles of your posed character and a construction shot or shots depicting sculptures, wireframes and textures. Essentially this is provides the viewer with an opportunity to be impressed by one piece of art and then learn how you created it in two or three images.

14 Using separate images can make tweaking your final result easier

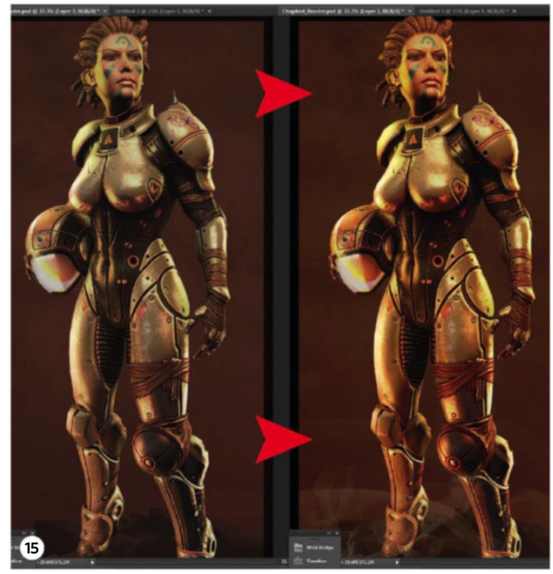
15 You can apply multiple adjustment layers to fine-tune the final appearance of your portfolio image

16 Keep the total amount of images for your character to a select few and don't overcrowd your portfolio

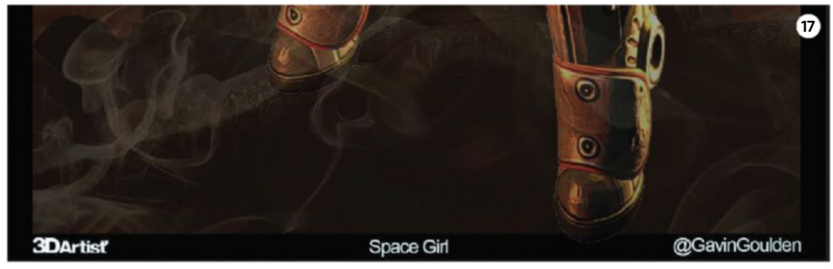
17 Add contact information to your work so that viewers know how to reach you

Self-editing your portfolio

An important thing to consider when creating your online portfolio is that quality beats quantity. Most, if not all employers would rather see a few strong pieces than a bunch of average ones. Along with this, consider the position you are applying for and the company. Does your work clearly say 'I understand this position and the type of games this company makes'? It should. You should make it easy for an employer to hire you, which means seriously analysing your work, trimming off the weaker pieces, keeping the shots of your work to an essential few images (beauty shot, turnaround, construction) and making sure your work fits within the job you are applying for.



15 Adjust colours and effects To finish, duplicate the image, desaturate it and set it to Soft Light at a low opacity. This helps to boost contrast within the image in a non-destructive way. Next apply Curves, Color Balance and Brightness/Contrast adjustment layers to tweak the final image. Much like in Marmoset, this is really just a case of seasoning to taste, with no hard and fast rule. The main thing to keep in mind is that the final result should be relatively close to what a game engine could achieve. Bring in the background plate for the image, for example a skybox, and create a pedestal for the character. This image simply uses a pile of rocks, which helps ground the character into the scene.



17 Add contact information and details Don't forget to add contact information to your piece. This can be your name, email address, Twitter account and so on. Consider one of your images floating on the internet that a potential employer sees. They like it so much and happen to have an opening on their team for this person, but have no information regarding who made it. That is an opportunity lost. The information should be subtle, but noticeable and easy to read. It doesn't need to be a watermark, just simply placed in the corner of your image.

• DID YOU KNOW? • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

“I studied the pose for this character for some time and then created it in ZBrush. I added detail while constantly altering the forms and silhouette”

“Ron Mueck’s sculptures have a lot of interesting features. The pose and negative shadows altered by Mueck create an appealing space around the sculpture”

Ron Mueck Tribute 2013

This was a personal project I did as a tribute to one of my favourite sculptors. A source of inspiration, Ron Mueck is held in high esteem by myself and many other CG artists. His attention to detail through realistic execution of the human form is just incredible.

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Mohammad Modarres

Website www.3mmart.com
Country USA
Software used ZBrush, UV Layout, MARI, 3ds Max, V-Ray
Bio Mohammad is a self-taught artist, working on games, toys and animation as a freelancer

Software used in this piece

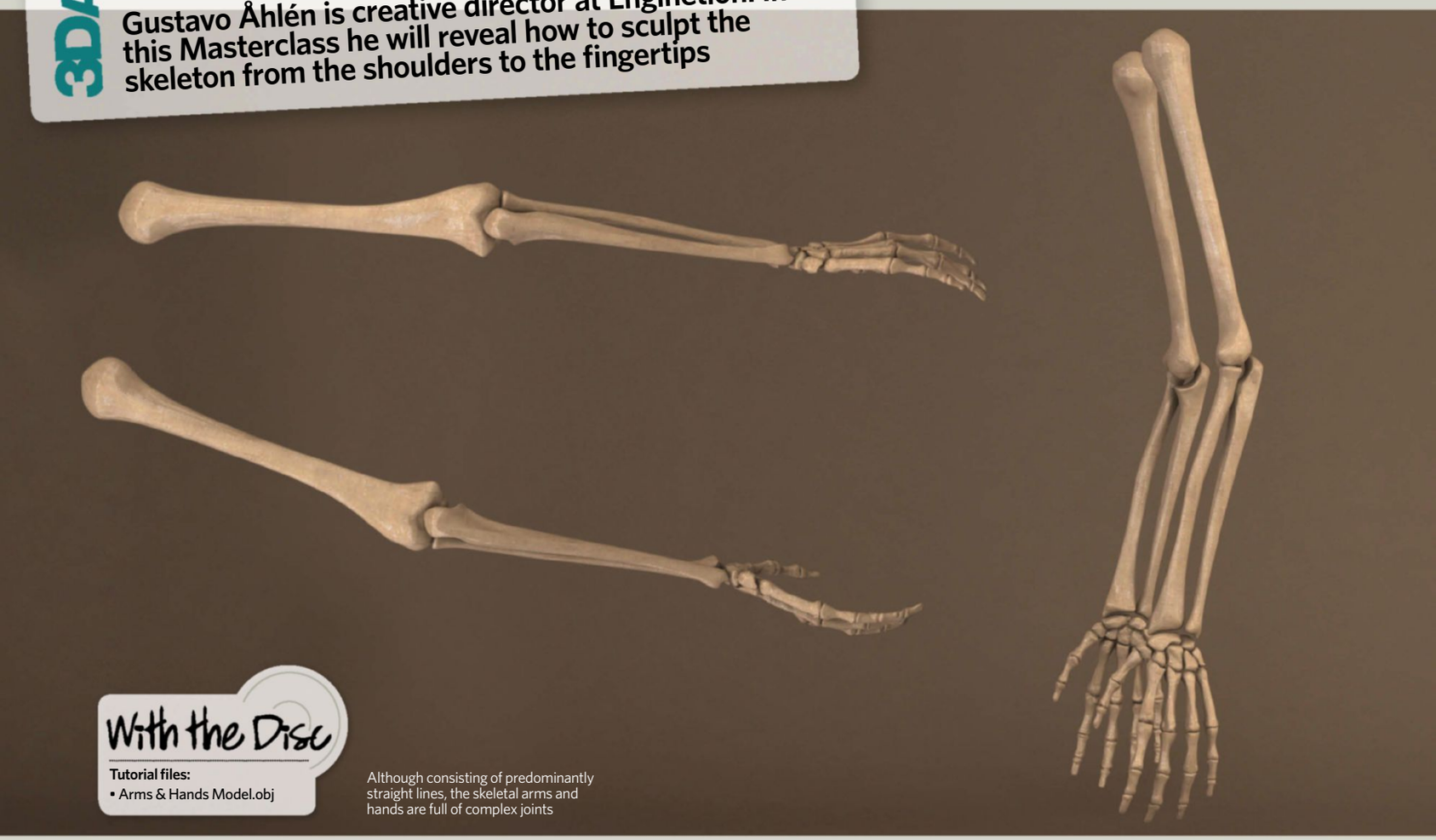
ZBrush | UV Layout | MARI | 3ds Max | V-Ray

"The texturing for this model was completed entirely in MARI and the render was done in V-Ray for 3ds Max"

3DArtist

Masterclass

Gustavo Åhlén is creative director at Enginetion. In this Masterclass he will reveal how to sculpt the skeleton from the shoulders to the fingertips



With the Disc

Tutorial files:
- Arms & Hands Model.obj

Although consisting of predominantly straight lines, the skeletal arms and hands are full of complex joints

Sculpt limbs in ZBrush

"The master of anatomy, Gustavo Åhlén, presents a simple guide to help artists to improve their skills"

Continuing this series on sculpting skeletal anatomy, here you will learn how to accurately produce CG human hands and arms from scratch. The techniques used will help you to understand the different ways to replicate these human parts and significantly increase your anatomy skills.

It's always advisable to learn this process step by step and to not attempt the entire tutorial in one go. More often than not, these skills are best acquired after hours of practise and a lot of trial and error. Just persevere and stay confident until you get the results you're looking for. Reference to the ZBrush manual is highly recommended to understand the correct use of the various tools we'll be applying.

Firstly, we'll give a brief overview of the bones of the arms and hands, to better understand the approach to creating them.

The human arm consists of three bones: the humerus, ulna and radius. The hand is made of 54 bones, which in turn are separated into three distinct groups: metacarpals, which form the core of the hands, the phalanges or 'finger bones' and the carpals.

The carpal area is an anatomical assembly that connects the hand to the forearm. Although this is a complex area, we won't be referring to each individual bone of the carpus in these steps. However, the internet and anatomical books supply great reference material if you want to expand your knowledge and improve your art. Reference images will provide you with a far greater understanding of the joints between the groups of bones, and to better visualise the various angles and rotations.

A fundamental point to remember before we progress is to consider the proportions of each bone. You can base your works on models or perform sketches on paper to get a better understanding of the scale of each bone.

When using a frontal view as reference, it's important to understand that although we can't see it, the hand bones are not fully extended and are in fact slightly contracted. To fully appreciate this quirk, we should use side views as a reference. Although, the more variety we have in terms of reference images, the more accurate our models will eventually become, so try to find various skeletal poses to inform your work.

Finally, the ZBrush Polygroups function is an essential function for separating our models, because it enables us to split the skeleton into different parts as SubTools, or combine them. You can learn more about Polygroups by checking out the boxout later on in this Masterclass, where we will cover how to best apply them in your work.

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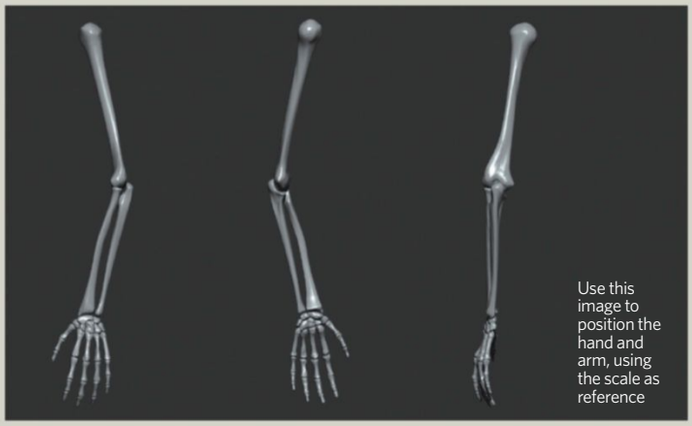
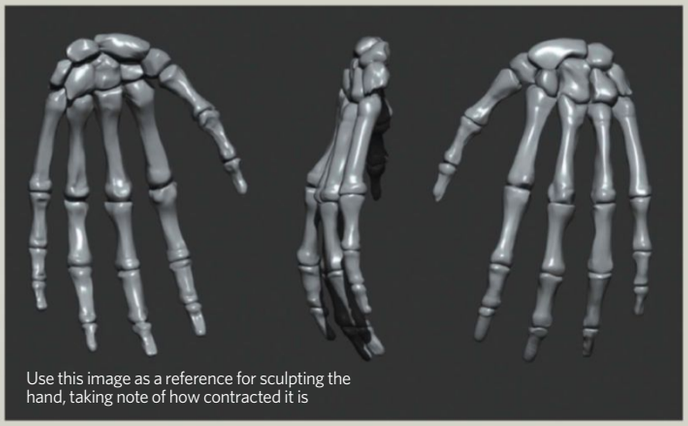
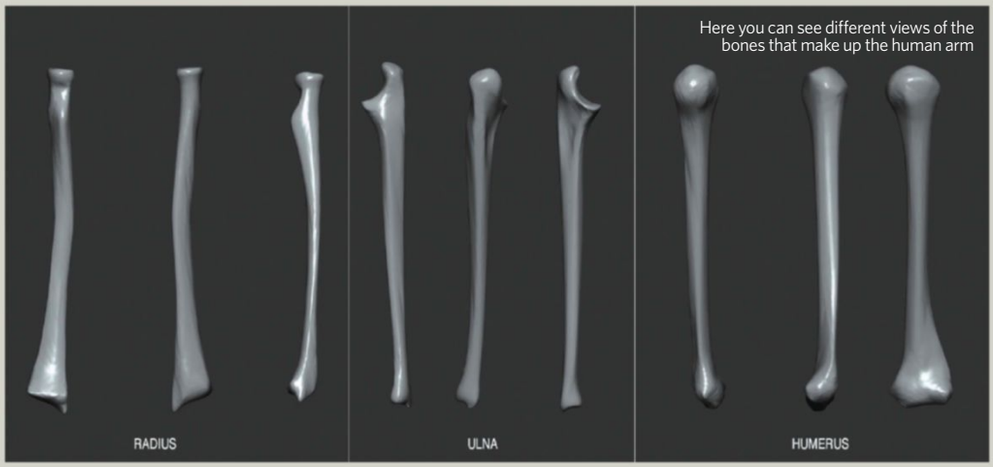


Use this image to position the hand and arm, using the scale as reference



Use this image as a reference for sculpting the hand, taking note of how contracted it is



Here you can see different views of the bones that make up the human arm

Polygroups

Polygroups is a useful sub-palette in ZBrush that enables us to combine polygons using different procedures, such as: Auto Groups, UV Groups, Auto Groups With UV, Merge Similar Groups, Merge Stray Groups, Groups By Normals, Group Visible, Group Masked, From Polypaint, From Masking and so on. These options are perfect for this work and in this particular case I have used Group Masked as well as Group Visible to separate the carpals, metacarpals and phalanges in different Polygroups. This enables us to split them into SubTools if we want to access separate bones.

Create arms and hands

01 Start with a ZSphere

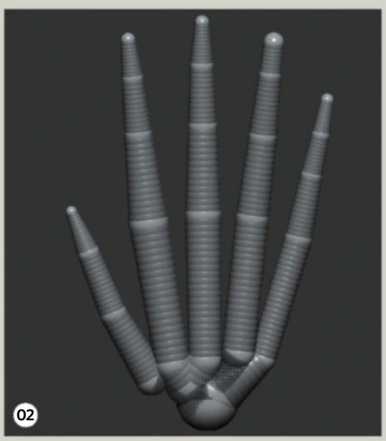
To begin we need to add our first tool, which in this case is a ZSphere, so go to the Tool tab and select it. Now click on the background (the work interface) while you drag and drop over it. In order to make this ZSphere editable, we need to activate Edit mode (keyboard shortcut: T). Now go to Texture>Image Plane>Load Image to open the reference images you've sourced for accurately sculpting the hand.

02 Add the hand bones

Now it's time to draw the metacarpals and fingers. For this we need to change the brush's size, moving to smaller values and drawing a new smaller sphere over the main ZSphere. When this new sphere starts to appear, go to Move (keyboard shortcut: W) and adjust it until the joints begin to appear. Now, over a new joint, draw another sphere and do the same step for each finger. You'll have to keep in mind that each finger will start from the main ZSphere you originally made. Also pay attention to the brush's size, as this will define the width of the fingers. Note that you'll be able to see the joints that are being created in a lighter grey than the rest.

03 Refer to the side views

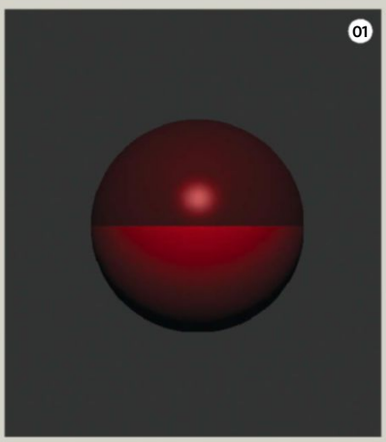
In the previous step we were working in a frontal view, but now we need to move these joints using the side views. This process will alter the length between the joints, so try to get similar proportions to the reference image you've picked. Remember, you need to change from Draw to Move mode using small values of Draw Size, because if you have high values you will inadvertently modify other joints. Keep this in mind when you need to move closed joints. For further advice for moving the joints, check out some of the accompanying boxouts throughout this tutorial.

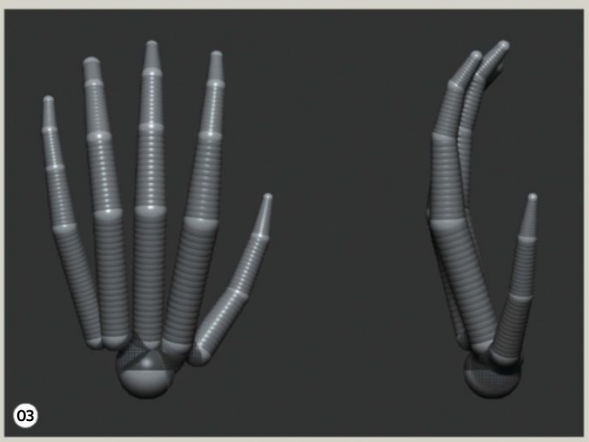


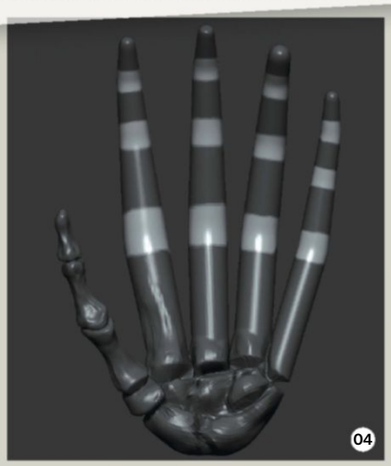
01 Use ZSphere to create the hand's basic shape

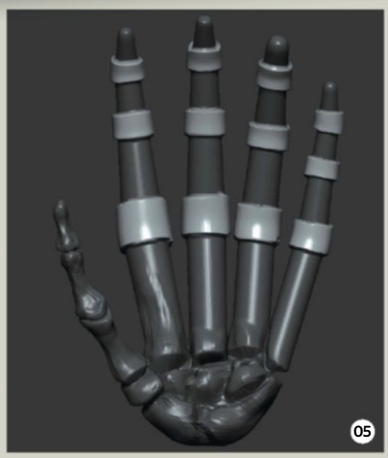
02 The simple skeleton for the hand is the first step before we convert it to clay

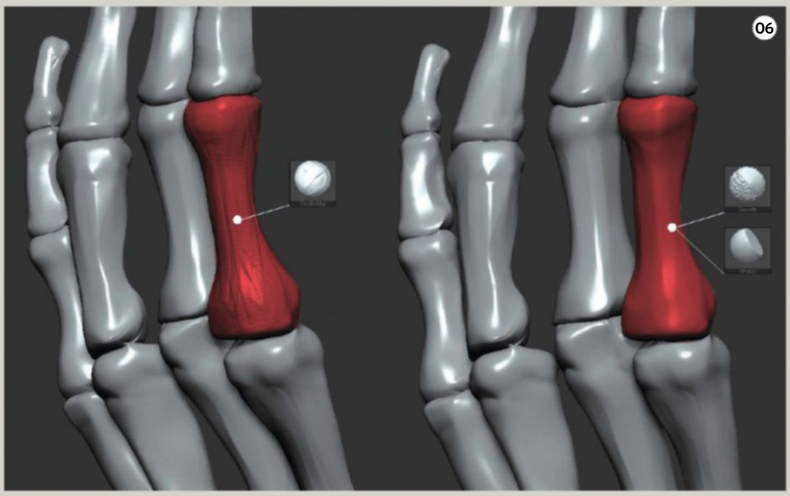
03 Using frontal and side views helps us to control the length between the joints

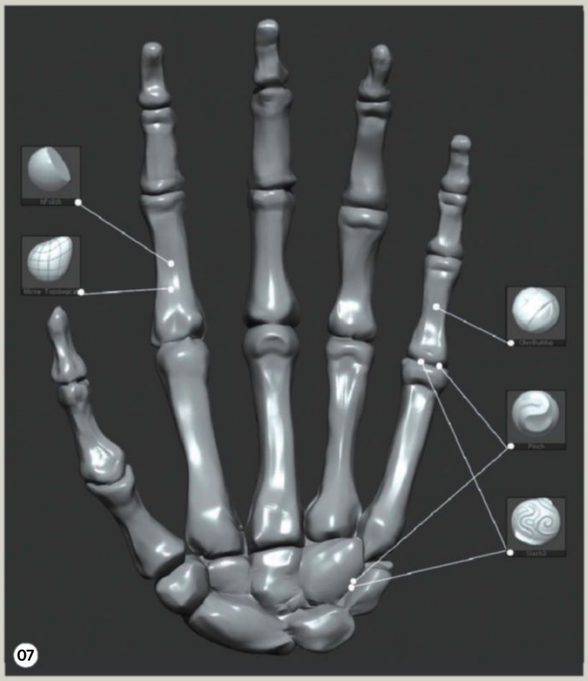












Save Adaptive Skin until last

When using primitive forms on a project like this, we often turn them to PolyMesh 3D, because it's the best mode to sculpt these kinds of meshes. In this particular case I avoided activating Adaptive Skin until the last step, before converting it to Polymesh. This way we can return to the original ZSphere to make new changes in the joints. To do this, just go to Tool>Adaptive Skin and select Preview.

04 Convert the model to Adaptive Skin to begin sculpting

05 The Deformation options are very useful to create changes in the unmasked areas

06 By using various Intensity values in our brushes, we can maintain greater control over the mesh

07 You'll need to use a wide range of brushes and values to build up the correct details

08 Use ZSphere to create separate SubTools for each arm bone

04 Convert to Adaptive Skin

After we have the skeleton of the hand, we can see a preview of the model by converting our skeleton to Adaptive Skin. Hit A on the keyboard, or go to Tool> Adaptive Skin. It's vital that you change the Density values, because this will increase or decrease the subdivision level (SDiv). In this case we've opted to use a Density of 5. Now we need to mask all by holding Cmd/Ctrl and clicking in an empty space. Now unmask the joint areas by holding Cmd/Ctrl+Opt/Alt and unmask the areas as you can see highlighted in the screenshot.

05 Define the basic shapes

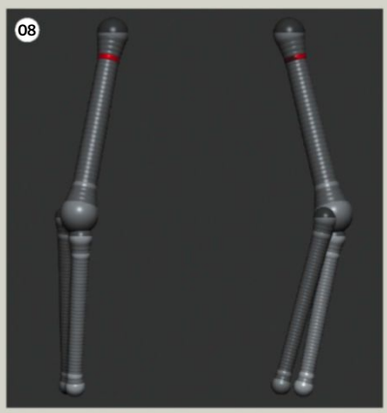
Now we can inflate the unmasked areas to begin sculpting the joints, which are more bulky than the rest of the skeleton. To do this, go to Tool>Deformation and increase the Inflate levels. It's also a good idea to increase the clay in suitable regions. After this we need to unmask all, holding Cmd/Ctrl and clicking over the background while dragging and dropping.

06 Sculpt the hand

Now we are ready to begin building up the main mesh of the skeleton. With your reference images close at hand, pick the Move Topological brush and attempt to achieve an approximate re-creation of what you see. The Move Topological brush is preferable because it moves the mesh separately from the rest of the polygons. You can experiment with the Draw Size to understand the differences between the Move and Move Topological brushes. Next you can use the Clay Buildup brush with a low Intensity, such as 20, to gain better control over the clay.

07 Include small details

This step will require a combination of brushes. Clay Buildup is used to get an approximate shape; Smooth is used to smooth the mesh; Slash3 will create separations between the bones (joints); Pinch can reduce the space between these separations; and hPolish will flatten the curves or irregular meshes. Try to experiment with hPolish to test this brush, holding Opt/Alt to flatten the mesh under or over the current mesh. Opt/Alt will reverse the current option that's selected (Zadd or ZSub). After sculpting, you can convert the model in Polymesh 3D by going to Tool>Save As.



08 Apply more ZSpheres

Open a new empty document. In this step we need to make different SubTools for the bones of the arms, namely the humerus, ulna and radius. For the humerus, load a reference image, then go to Tool>ZSphere and add a ZSphere. Change the size of the ZSphere and draw over the reference images, following the same steps previously used. Now, to create the ulna and radius bones, go to SubTool>Insert, load a new ZSphere and repeat the previous process. Remember to use separate SubTools for the various bones of the arm.

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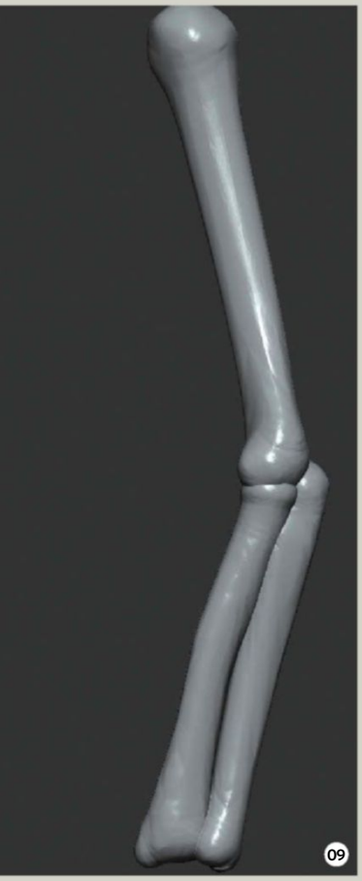
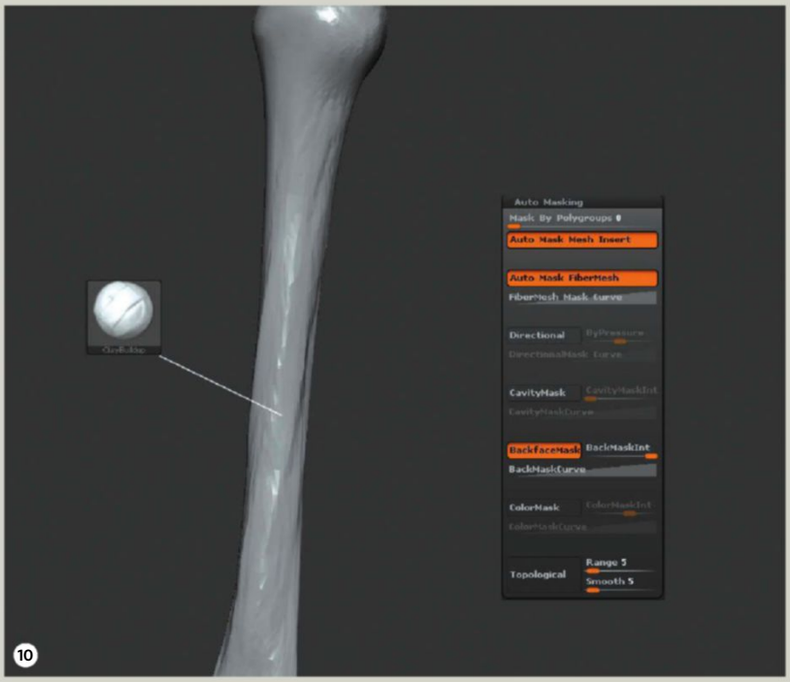
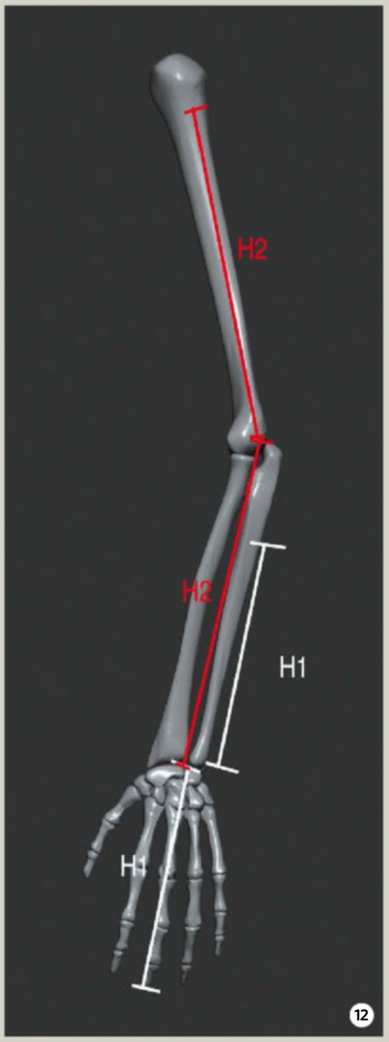






09 Getting a rough mesh for the final model using Adaptive Skin

10 Backfacemask is a useful tool that enables us to protect the mesh while we sculpt

11 Converting the SubTools into Polymesh 3D enables us to get better control over the meshes

12 Position the bones of the arm and hand over your reference images. Don't forget to check the scale

09 Convert the ZSpheres to Adaptive Skin

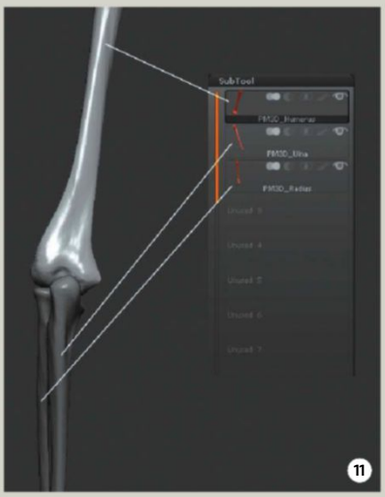
Now we need to convert each SubTool into Adaptive Skin (keyboard shortcut: A). Go to Tool>Adaptive Skin and increase the Density setting in each SubTool to get a better quality before sculpting on the clay. Ideally you should get something similar to the screenshot, without a defined mesh and overlap.

10 Refine the arm bones

After converting these bones to Adaptive Skin, we need to sculpt the clay using brushes, such as Clay Buildup with Backfacemask active (go to Brush>Auto Masking>Backfacemask). It's advisable to hold Opt/Alt while you are sculpting, in order to subtract the clay (ZSub) using low values of Intensity. The hPolish brush can help you to get a flatter mesh to produce a more defined model. After this we can use the Smooth brush while holding Shift to smooth the mesh using low values of Intensity. Repeat this for each SubTool.

11 Convert your SubTools to Polymesh 3D

Now convert each SubTool into Polymesh 3D. For this it's important to rename each SubTool: 'humerus', 'ulna' and 'radius'. If you hit Make Polymesh 3D over a SubTool, this will then create a new mesh called PM3D_humerus, or whatever name you have given to your SubTool. Automatically, this will change to the new mesh created as PM3D. You need to return to the original tool where the three SubTools were and convert these to Polymesh 3D. Once you've created the three SubTools into Polymesh 3D, go back to the first Polymesh you created and insert the other two new Polymeshes by going to SubTool>Insert.

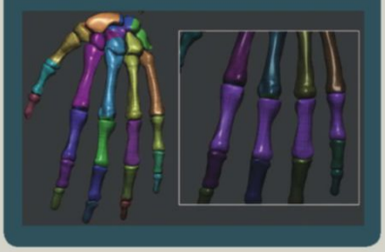


12 Refine the positions, scales and angles

With your reference images still close at hand, load the two tools (the hand and arm), select one of them, then go to SubTool>Insert and load the other tool as a SubTool. Next rotate the hand and arm, attempting to find a good fit between the two. Simply follow the reference images carefully, taking into account the positions, scales and angles that are used and noting that the hand and arm are not extended but have a slight bend. Activate Symmetry to produce the other hand and arm. You can now export the project as an OBJ file and open it in any 3D software.

Mask the meshes so they separate into different SubTools

As I mentioned previously within this Masterclass, if you want to separate the mesh into SubTools, start by masking the area that you want to split, such as the metacarpals or phalanges. Next, go to Tool>Polygroups and select Group Masked. You can either apply Invert Mask to separate the other areas, or do this manually. Once you've separated the metacarpals and phalanges into different Polygroups, you can convert this mesh to PolyMesh 3D and then go to Tool>SubTool>Split and select Groups Split. Now select the SubTool and click Close Holes.



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Timur 'Taron' Baysal
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Timur, AKA Taron, was a freelance artist in Germany for several years before making the move to Los Angeles. He is currently working full-time as a software developer

Photoshop
Jorge Lacera
www.lacera.blogspot.com

Born in Colombia, Jorge studied in Miami and is now a concept artist at Irrational Games in Boston. He specialises in creating in-game 2D assets and supporting marketing materials

With the Disc

Tutorial files:
- Both the raw and the painted Viking model

Sculptris

Paint in Sculptris

ESTIMATED TIME TO COMPLETE THE TUTORIAL
20 MINS

How can I use Sculptris to paint a character model?

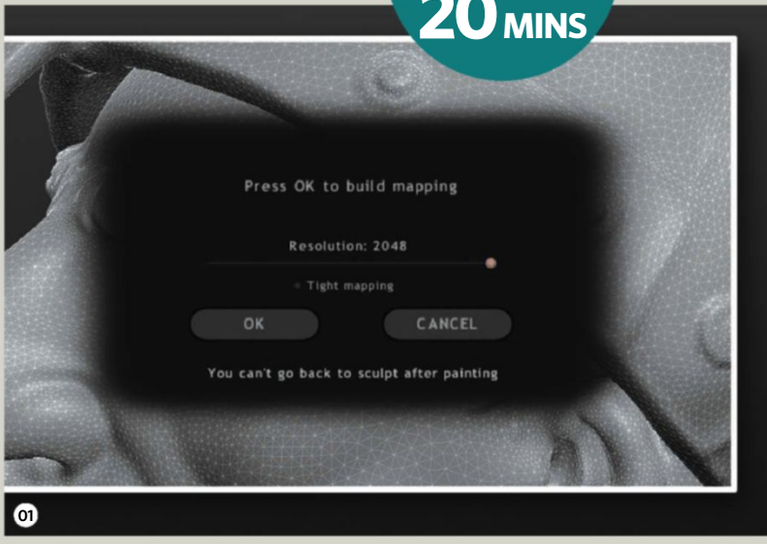
Not yet fully developed, but still full of magic, Sculptris' Paint mode follows in the footsteps of its glorious Sculpting section.

Here we'll take a brief look at the very basic features you'll want to use. Remember that Sculptris is still primarily a 3D sketching tool and as such the Paint mode mainly sticks to essential functions.

Case in point, the three brush modes: Paint (D), Bump (B) and Flatten Bump (F). While the program does have a kind of smoothing/blur mode that acts equally for Paint or Bump modes by holding down Shift, it's best to use this carefully, as UV tiles may cause trouble. You can adjust how the brush acts via the Options panel. The fourth button you'll find in the Brush section of the interface is the Fill (F) feature.

Even Sculptris' Color Picker is stunningly rudimentary, where you can pick the hue and brightness on a colour wheel, while a slider adjusts the saturation. I'm not particularly thrilled about this feature, but it does the job for our purposes here. Holding down C enables you to pick a colour from your already painted sculpture. This also goes for Alpha values should you complete any material blending, which is where Sculptris' power kicks in once again.

Another highly useful aspect of Sculptris is its ability to combine colour- and bump-painting via the Options panel, as well as its use of Alpha masks, which I'll cover last. Supplied with this issue you'll find the medieval soldier bust that we'll be using to guide you through the painting potential of Sculptris.



01

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CINEMA 4D
Paulo Wang
www.cargocollective.com/ezra1311

Paulo is a motion designer based in Vienna, Austria. His main tools include CINEMA 4D, After Effects, RealFlow, Photoshop, Illustrator and Premiere Pro

3ds Max
Richard Benson
www.umolab.com

Richard trained as a product designer in Huddersfield. He co-founded Pikcells Visualisation Studio in 2003 and is a director of the online marketplace Umolab

ZBrush
Thomas Lishman
www.tlishman.co.uk

Thomas is a freelance digital artist currently living in the UK. His work ranges from digital illustration and modelling to concept art. His key interest is in digital sculpting

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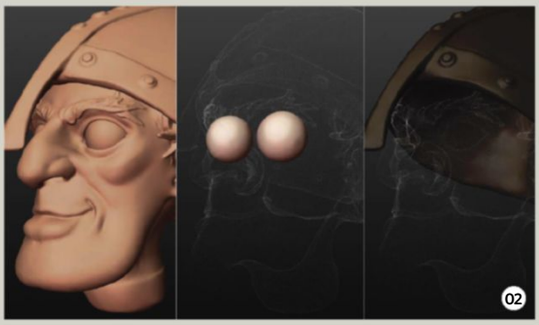


01 Head into Paint mode

As soon as you hit Paint on the interface, the pictured dialogue box pops up. 99.9% of the time it's best to immediately crank the Resolution slider up to 2,048. Tight Mapping often seems like a risky business, as it can lead to some problems on the UV map, potentially scattering it into smaller pieces. Tight Mapping also instigates a much longer process, which is reason enough to go for another option.

02 Fill it up

Once in Paint mode, the sculpture will be unpainted, so pick a skin tone – bearing in mind this example is quite cartoony – and hit F to fill the whole model. This sculpture has three individual geometries: head, eyes and helmet. Hide the head and eyes by holding down H and clicking on them. Now pick a colour for the helmet and fill it. Cmd/Ctrl+H will reveal everything again, but keep the helmet and head hidden for now, so you're free to fill in the eyes.

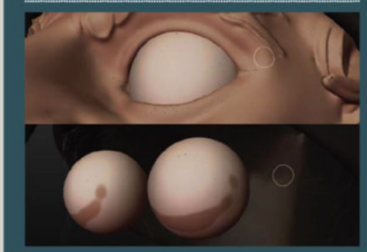
03 Time to paint

Now it's time to use the Paint Brush (B), so pick a colour for the hair and apply your chosen tone. The Brush settings work exactly like the sculpting brushes. In Paint mode we can also make good use of masks. In the Options panel you can set the Brush Spacing to 5%, which only matters while the Airbrush mode is off. It is advisable to keep Surface Angle Falloff off at this point.

04 Apply more details

Having applied the base coat, we can start to bring in some details. To flush the skin a little, pick a skin tone and tweak it towards red with some more saturation. Lowering the strength of the brush helps to carefully redden the nose, cheeks, chin, ears and around the eyelids. Painting the iris with some imagined lighting is fun and you can finish by detailing the rivets on the helmet.

Give it some puff



Hiding geometry doesn't entirely protect it from getting some artefacts of whatever you apply to adjacent areas or fill actions, so you may have to clean up a little afterwards. I would suggest only filling during the very early stages when corrections are easy. Masking is more reliable in this regard, but it's somewhat sensitive to crashing.

05 Use some material magic

The two little dots around the material icon let you step through the material slots, so go to the second and pick a metallic material. The Edit feature enables you to paint on that material. Go over all the rivets on the helmet with it, then go to the third slot and pick a glossy translucent material to paint on the eyes. Also faintly apply this to all the reddish areas on the skin.

06 Alphas and bumps

Pick a Brush Alpha with Stippled Noise, then in the Options panel set Brush Spacing to around 90% and toggle on Combine Color and Bump. Select your chosen hair tone and start adding stubble. You can hit X and pick a colour for the Inverse brush to add pores.

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FOLLOW GAVIN GOULDEN'S SPACEGIRL TUTORIAL
page 70

Photoshop

Retouch your 3D models

"How can I use Photoshop techniques to help sell my character asset?"

The goal of this tutorial is to give you a better understanding of how your 3D model can be retouched in Photoshop for use in marketing materials. Typically 3D videogame character art is used directly as the Key Art in marketing, for use in billboards, posters, magazine covers and so on. This does require some retouching work in order to make the model truly shine.

Always cast a critical eye over your work keeping in mind that the consumer (the gamer) needs to look at your piece and think it's cool. As such I'll be using some basic techniques to tighten and emphasise the existing design.

Gavin (Goulden, see **3D Artist** issues 52 to 55) and I had already decided what this character would be and how she would be designed. We always intended for her to feel appealing but tough, and certainly not a damsel in distress. In picking her pose, it was vital to convey this in her body language. Gavin provided me with a number of options and we decided on this one because of its clarity and emphasis on the character's face.

Once this pose was decided upon, my task was to make the asset ready for use for a range of marketing purposes as the hero asset for a videogame. It had to look exciting and draw in the viewer. With this in mind I scaled it in Photoshop and began the cropping process. Gavin provided me with the image at quite a high resolution, which made my job easier as print materials are produced at 600dpi.

Layered files

Marketing deadlines can come fast and furious, and require that the artist involved be flexible to any potential change. As such, it is important to provide layered PSD files to the client when working on promotional materials such as these. The marketing designers will want to have as much flexibility as possible when preparing the assets for a big videogame launch, and using layers means your work is open to desired changes and modifications.

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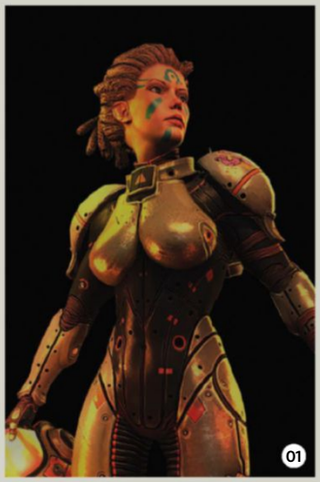
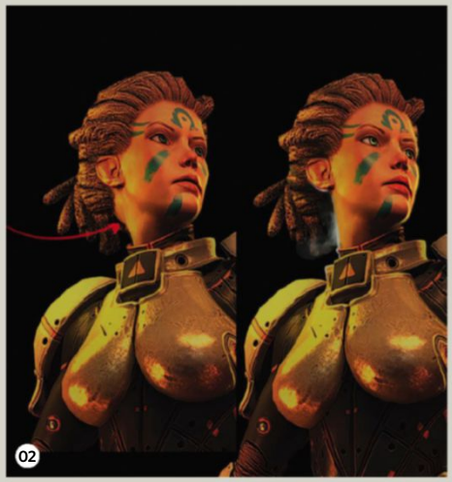
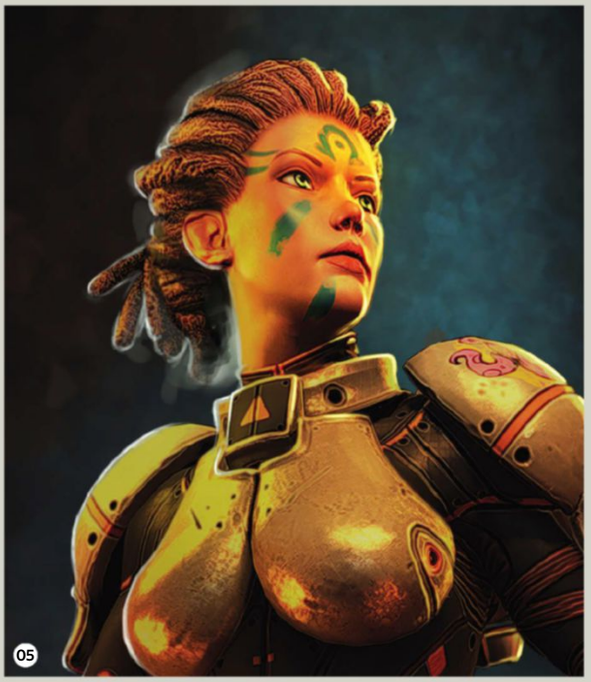
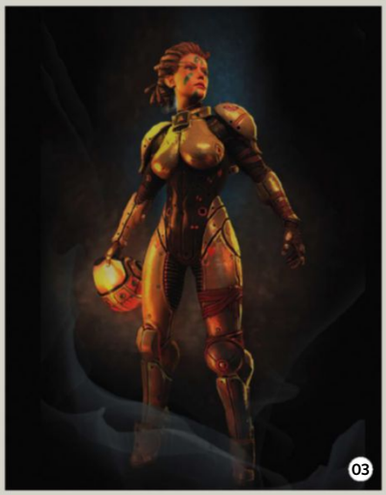








01 Overlay some blur

First remove or mask the Background layer in Photoshop to leave a clean layer with just the character to work with. Duplicate this layer, apply a Gaussian Blur, then set the layer's blend mode to Overlay. This technique has been adapted from a media method used in film. The blur creates the effect of subtly blending edges on the form, while the Overlay blend mode punches up the tones. This should be used with an eye to preserving the existing colour and developing the forms. The blend can be adjusted by lowering the opacity. Alternately you can use a Hue/Saturation and boost the brightness to create the desired effect.

02 Repaint elements

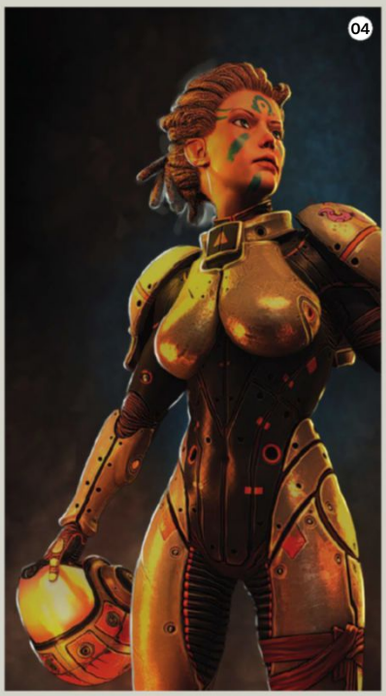
Sometimes, while posing a 3D model, there can be small instances of distortion where joints interact or twist. This is normal and imperceptible in the game itself, but looks weird when static and blown up. It's vital to take the time to spot these instances and retouch the image in Photoshop. This typically requires some painting skill but your goals should be to match and enhance the inherent model, not to redo the work.

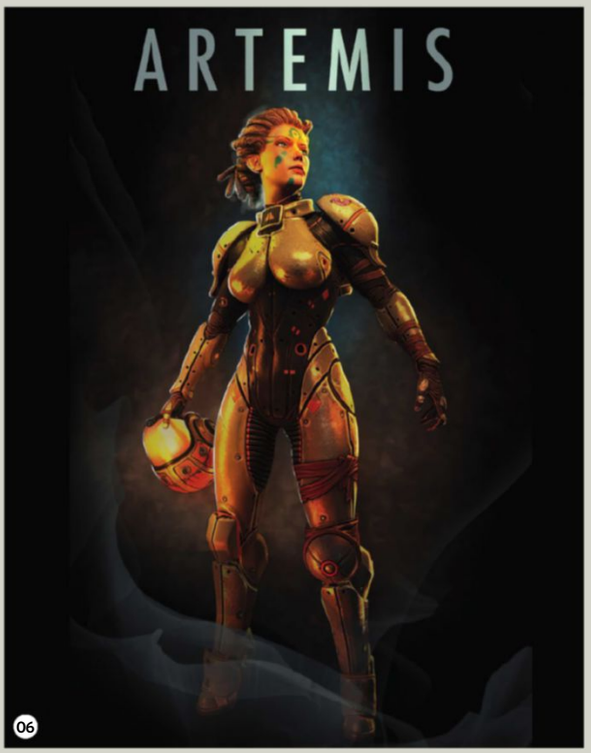
03 Edit the background

Typically this type of marketing piece is set in an environment that highlights a moment or level in the game. However, in certain cases marketing materials need to go out well in advance of final assets being ready. In this example we simply don't have an environment to use, so we can just go with a subtle shimmer effect that implies a spacey, sci-fi mood. If you have an environment you think is suitable, feel free to use it.

04 Use rim lighting

Rim lighting can draw the eye around the character and the secondary forms. This is an easy and effective way to add interest and to hint at a second light source. In this case we've added a subtle rim light to emphasise the far-left forms. Paint these in using a round brush set to 50 Pressure Sensitivity and Screen blend mode.





05 Add the light source

Even though you should have the light source in mind at all times, the face will need to have a bit more attention than the rest of the model. Set a layer to Overlay and use a selection tool to isolate the area around the face. Use the Gradient tool to drop a white gradient across her face to give the effect of light falling across her form.

06 Logo and copy

You'll want to leave a solid amount of space on the top of the image for placing a logo. Typically the marketing designer will handle this step, but it does help to keep this in mind while generating the image. Here we've typed out a logo using the Futura font.

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CINEMA 4D, RealFlow

Abstract simulations

How can I create a dynamic splash animation using CINEMA 4D and RealFlow?

Recently I was looking for a way to create splashes that seemingly appear out of thin air. While doing research on melting techniques in RealFlow, I realised that I could use Filter Daemon to achieve the effect I wanted. Filter Daemon enables you to transfer and shift particles between different emitters without having to rely on custom Python scripts. It may not sound like much, but this is an extremely powerful technique.

The basic idea is to move a simple piece of geometry through containers filled with particles. All the particles that reach a certain velocity will then be transferred from the Source emitter to a Target emitter and form a multicoloured splash.

First we need to set up the scene in CINEMA 4D (or your 3D package of choice) by creating and animating a few Primitive objects. We can then import our scene into RealFlow, where we'll add all the necessary emitters and Daemons, before setting the basic simulation options.

After adjusting the Particle attributes and setting up our Daemons, we can organise our scene with exclusive links to control the interaction between the emitters and run a low-resolution test simulation. The final simulation will be prepared by tweaking the Particle attributes and Daemon settings further.

As a final step we will build a standard mesh for our fluids in RealFlow, before heading back to CINEMA 4D. Then we'll quickly run through working with Weight maps to mix the fluids You should end up with a unique, abstract simulation.

01 Set up CINEMA 4D

Create a new CINEMA 4D scene, setting the Frame Rate to 60FPS and the Document Time to 150F. Add a Circle spline to the scene and leave the Plane at XY. Check the Ring and Ellipse options and set the Radius, Radius Y and Inner Radius to 500cm, 265cm and 430cm respectively. Add this to an Extrude NURBS and extrude it by 100cm before making it editable. This elliptical ring is our main piece of geometry that will drive our fluids in RealFlow. Now add four cubes with the dimensions of 312 x 1,250 x 1,000cm and arrange them along the X-axis so that there's no space between them. These cubes will serve as our fluid containers. Before we're ready to export our scene we'll need to make a simple animation of the ring. Add the ring to a Null, then animate the position and rotation for both the ring and the Null so that it moves through the cubes. The splash we'll create in RealFlow is a direct result of the geometry and motion of the ring, so experiment with different shapes and animations to get a range of various results. We're now ready to export the scene with the RealFlow Exchange plug-in. Add all the elements, set the Frame Range and the location for the SD file and hit Export.

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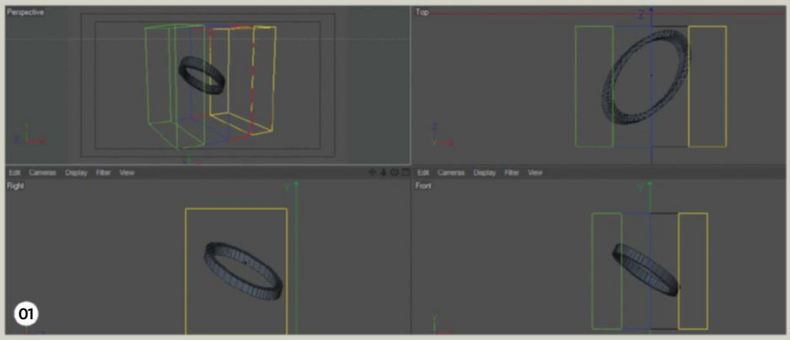
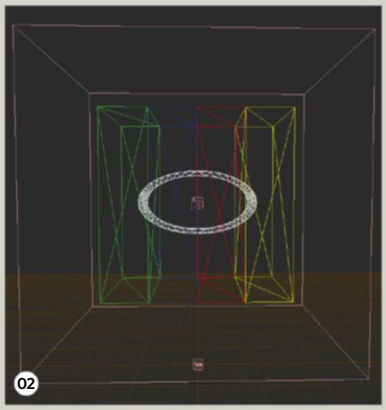
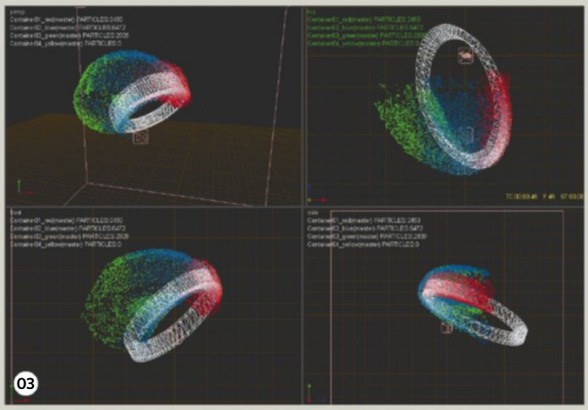


Getting the jitters and other RealFlow troubles

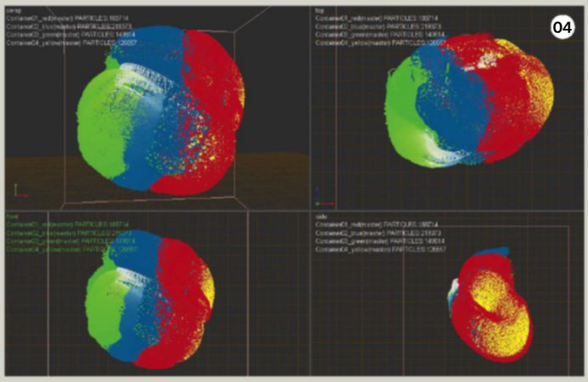
Everyone working with RealFlow will experience the dreaded mesh jittering at one time or another. One solution to this is to increase the Scene Scale, as well as input higher substep settings and very small Mesh Polygon sizes. Here the final simulation was set to a Scene Scale of 1.0 and each of the cubes has a surface of 390m^2. Consider raising your Substeps, especially when dealing with slow-moving and viscous fluids. Also, try using small polygon sizes for the mesh, even though this will drastically increase the mesh file size.





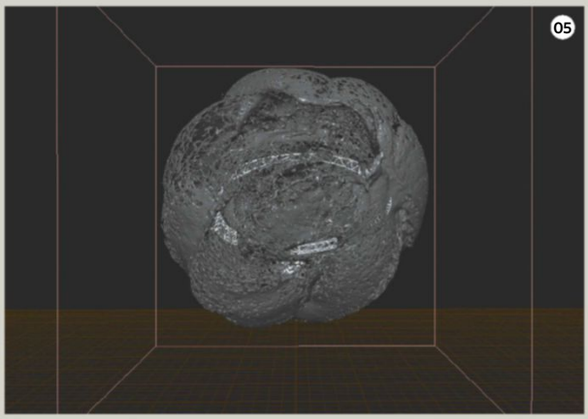
02 Begin the simulation

Head into RealFlow, import the scene file that we just created, then insert four Container and four Fill Object emitters, one for each colour. We also need four Filter Daemons, a Drag and a k_Volume Deamon. Navigate to your Simulation settings, change the FPS to 30 and the MAX substeps to 50-75. You should also adjust your Scale values if necessary. To keep track of all your various scene elements, rename your emitters and Daemons according to their colour. You can also organise them into groups and layers.



03 Prepare a low-resolution test simulation

We are now ready to adjust the Particle attributes of our emitters, so lower the Resolution to 0.5. We're trying to get the look of thick paint, so set the Density to 1,200 and the Internal Pressure to 0.1. The External Pressure for the Fill Object emitters can be left at the default of 1, but raised to 20-30 for the Container emitters to help the splash keep its shape. Enter 8-10 for Viscosity and 0 for Surface Tension. Experiment with these settings to achieve different results. Set the Strength of your Drag Force Daemon to 1-1.5, then enter the Fill and corresponding Container emitters into the Source and Target fields of the Filter Daemons. Set the Attribute to Speed and the Value to 2. We'll need to work with exclusive links to control the particle interaction, so clear the Global Links panel and drag all your emitters to the Exclusive Links panel. First add the Drag and k_Volume Daemons, as well as the ring, to all the emitters, then add the Filter Daemons to their corresponding Fill Object emitters. Add the Container Only attribute to the Container emitters and the Fill Only to the Fill Object emitters. Fill the cubes with particles and run a test simulation. To be able to see what's going on, turn off the Visibility of the cubes and the Fill Object emitters.



04 Refine the results

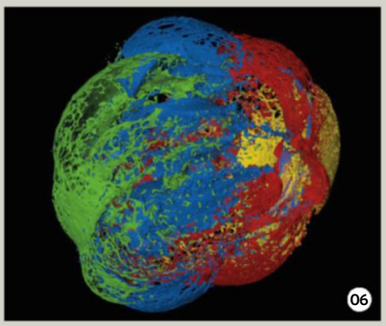
Now that we have a first impression of the simulation, all that's left to do is raise the Resolution. Here we've used a value of 3 for the final simulation, but depending on your hardware and your available time you can easily go higher. Adjust the Strength of the Drag Force Daemon, set the MIN to 50, MAX substeps to 150 and hit Simulate.

05 Build the mesh

Add a standard Particle Mesh to your scene and insert the four Container emitters. Leave the Type at Metaballs, enter a Polygon Size of 0.0225, turn on Filtering, set both Relaxation and Tension to 0.1 and change Steps to 96. Leave the Blend factor at 95 and enter 0.0175 for the Radius. Make sure the Polygon Size always stays above the Radius to avoid broken meshes and also activate Deformation. Building the mesh usually involves a lot of trial and error. All the settings are interdependent, so here it's best to make a few tests and compare results.

06 Import the mesh

Head to CINEMA 4D, add a RealFlow Mesh Importer and enter the file path in the Setup panel to load the mesh. You will notice that the mesh has four Weight tags, which we'll use to mix the fluids. Create a new material and check the Alpha box. Add a Vertex map effect to your Alpha, then just drag the first Weight tag into the Vertex Map field. Change the colour of the material and add some Fresnel reflections according to your taste. Do the same for the rest of the remaining colours to finish, then stack the four materials onto the mesh.



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Replicate imperfections

"How can I get models of new objects to look more realistic?"

Photoreal CGI has entered a new era over the last few years, as huge advances in hardware and software make it possible for the standard of realism to reach an exceptionally high level and, most importantly, in an economically viable timeframe. The inherent nature of photorealism means that CGI can now often replace photography in many fields, and the need to accurately and realistically replicate the real world in 3D has increased enormously. However, the term photorealism needs pushing forward to reflect a higher standard that's being compared side-by-side with photography.

As an industry matures, what you start to see is a refinement of the fundamentals of it and a branching off of various areas. This is what we hope to achieve with Umolab: the advancement of photorealism. CG images now need to rival photography on a high-definition macro level, not just at a 2,048-pixel resolution. As hardware and software continue to advance and make photorealism easier to achieve, the thing that sets your work apart will be the details.

By default CG is perfect, which is one of the great things about it, but this is also its biggest downfall. When you're creating photorealism, this perfection can be a hindrance, as your eye naturally detects anomalies and synthetic-looking features in an image. Unfeasibly straight lines, sharp edges, repeating patterns and perfect alignment all betray a CG treatment.

This tutorial will show you a few quick and easy ways to add imperfections to your models and increase their believability. Hopefully the steps will help you to look past lighting and materials as the only way to make images look more realistic.

Many of these techniques can be applied to objects that need to look old, but we will be focusing on bringing realism to objects that are new and still need to look clean and tidy, as this is often overlooked. It's relatively straightforward to make something dirty, but quite difficult to know where to start with a brand-new object, as any imperfections need to be subtle.

There are a few ways to add realism to new objects, but one we will focus on here is what we call chaos. This is a key aspect of imperfection at object level and involves the disruption of the alignments and placement of each object. In reality nothing is perfect and this needs to be emulated in your 3D work if you are to achieve a natural result.

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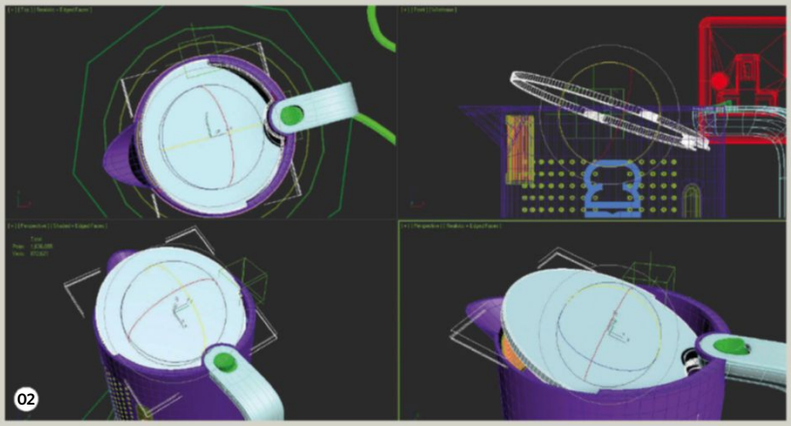
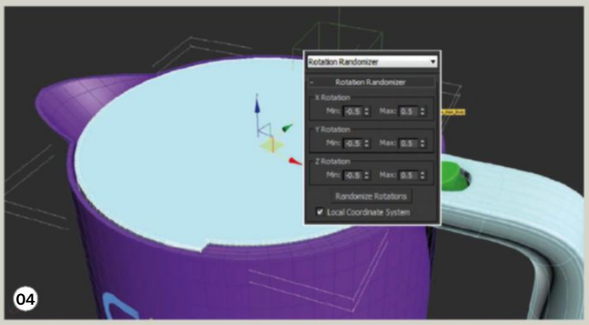


Create gaps

When placing objects, always ensure that you have gaps between the surfaces. This produces shadows and avoids the vacuum-formed look where objects appear to flow into one another. For objects with flat bottoms, leave a 1-5mm gap, depending on how large they are. For objects with a small surface area touching the surface, such as marbles, leave no gap. These look like they're floating, because they are!



01 Image analysis

Use a photo of a real object as a reference, as the best way to model something that exists is to have it in front of you. This way you can accurately analyse the imperfections, as well as the details, and also take measurements. Photos found online will generally have been edited in Photoshop to eliminate imperfections, so you're not getting a true-to-life re-creation there. Try to assess the imperfections in your objects, for example here the alignment of the lid is off and the handle joins don't fit. The most chaotic areas occur where parts are fitted together. You would assume, without checking, that these areas fit perfectly, but this isn't the case. You will find this level of chaos on most consumer electronics made predominantly from plastic.

02 Set the pivots

In order for each part to orient as it would in reality, we will need to set the pivots of each object, or groups of objects, to real-world pivot points. In short this just means if something has a moving part, such as a hinge, then we need to set the pivot to be at this point, so that when we rotate everything the points appear normal. If they are not hinged or move in any way, then set the pivots to the centre. Here you can see the pivot for the lid hinge being set.

03 Link to parents

In the same instance, you may need to link various objects to their parents, so when chaos is applied to the parent it moves the children too. For instance, if you have a door, you would link the handle and the lock to the main door. You could apply chaos to all three elements, but when you rotate the door you want the lock and handle to rotate with it.

04 Apply some chaos

Before we add the chaos, we need to think about the realistic amounts our object would have. As a general rule, the larger the object, the less you should apply and vice versa. This is relative to the scale of your scene and how much you have in it. An accurate graph of this would likely be a bell curve, where you have little chaos on the massive and the micro levels, with most occurring at the macro level. Also, think in terms of a building; something that big would not really need any chaos adding to it, mainly because you're seeing it from afar most of the time.

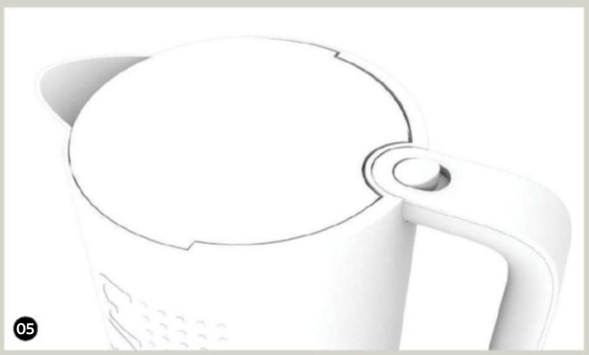
If you have the object in front of you as reference, you can simply re-create the levels you see. For most objects a value of -0.5 / 0.5 is acceptable. If you have the real version of the object, you can just keep replicating it until it looks correct. Select a single part at a time and add rotational chaos until it looks like the reference images.

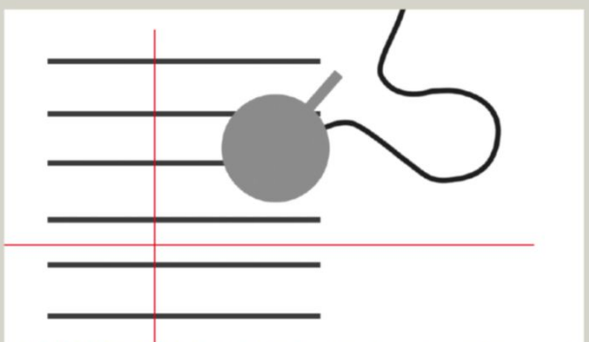
05 Check the intersections

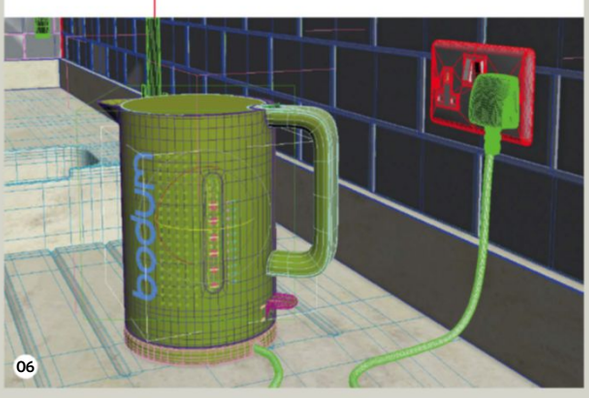
After confirming the areas of chaos, quickly check that no element has moved through anything else. With these kinds of tolerances and shapes, a collision could well happen, so it's best to have a quick check around to see if any of the objects have intersected their neighbours. An ambient occlusion render can show this up pretty quickly. Here is a quick render of the button and handle detail, but as we are rotating to the reference model our adjustments have worked fine. If you're doing these without a reference you would probably have more of these intersections.

06 Insert the model

Here is an image of the kettle in the scene. After adding the chaos, make sure that you position the object in the scene with the same principles in mind. Avoid placing it perfectly and add some slight rotation on all three axes. Also make sure that nothing is perfectly in line with any other major grid lines in the scene. Your eye will recognise patterns and perfect alignments as being strange and unnatural. Here you can see a drawing of the scene from above. Avoid having major features (the power cord) perfectly aligned with the two red lines, where features such as the sink drains are.







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ZBrush, Photoshop

Concept sketching in ZBrush

"How can I use ZBrush to quickly create multiple character concepts?"

Speed and efficiency are vital aspects in the industry and character-creation is no exception. The ability to explore and find effective designs is essential, as your first idea will rarely be your best. Some artists will create hundreds of variations of just one design to find the perfect balance the client wants. The more you create, the more it forces you to think creatively and differentiate from your original designs.

Thankfully, in recent updates ZBrush has grown into a powerful tool that can speed and assist in such a fast-paced workflow.

ZBrush now includes tools such as QuickSketch, DynaMesh and history states, which combine into an excellent platform for experimentation. In the following steps I'm going to cover the basics of these features and how they can be effectively used to speed up the concept process.

One of the most powerful new options introduced to ZBrush is DynaMesh. This tool enables you to actively retopologise the mesh while sculpting, granting great freedom to literally drag out an ear and then conform to the overall topology. This enables you to make quick and flexible alterations to an entire mesh.

History states, meanwhile, enable you to make changes to previous iterations of your model. ZBrush will save a recording of your sculpting progress, enabling you to drag back to previous levels. I use this to create variations of a base mesh, which can then be quickly accessed via history states instead of having to reopen the file every time I want to sculpt.

Another handy yet under-appreciated feature is QuickSketch, which enables you to quickly produce sketches, designs and drawings within ZBrush without relying on any external program support. You can swap from QuickSketch to sculpting with just a button and there are also ways of using the sketch as reference by either saving it out, or dropping it to the background while sculpting.

I don't merely treat ZBrush as a means to create final models, but also to produce concepts. These new features enable me to quickly and efficiently express my suggestions to clients and also to expand my own projects.

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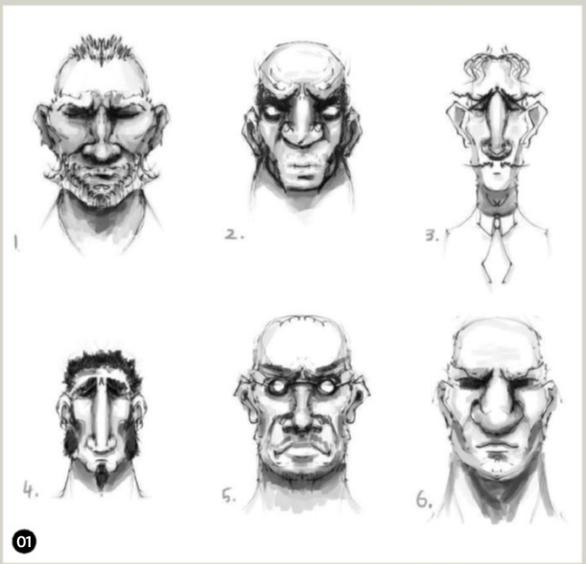
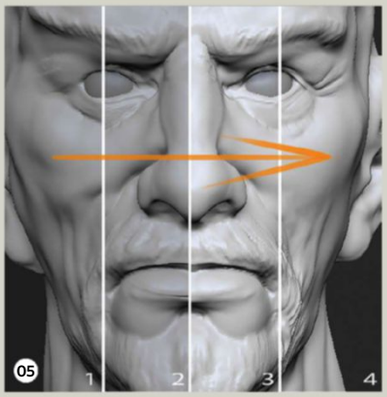




01 Concept initial characters

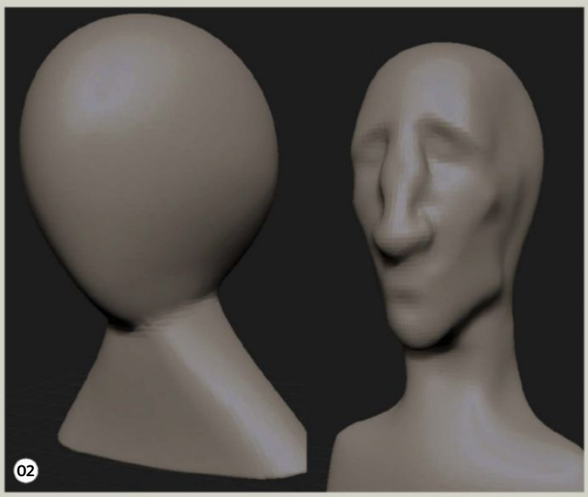
First select QuickSketch and draw some basic character heads. Enable Symmetry to assist you and focus on the silhouette of each character, making sure you keep each feeling unique. Here you'll want to diversify the designs as much as possible and get the broadest range of features to help you explore different styles and personalities. When you're done, export each character (Document>Export), load them into Photoshop and edit these into the same document. Number each head and select the three that you feel are strongest.

02 Begin sculpting

Load a default dyna-sphere file from the Lightbox palette and use a Cylinder InsertMesh brush to create a neck. Apply DynaMesh to this (Cmd/Ctrl-drag outside the model), grab the Move brush and start shaping the head to match your initial concepts. Make the most out of each DynaMesh resolution and start sculpting with the Clay Buildup brush. Early in the process, make sure you focus on the key bony landmarks as seen most predominantly in the skull (eye sockets, cheekbones and jawline). This will help give your character definition.

03 First head

Once you have the base forms down and key landmarks, you can increase the DynaMesh resolution and start working on more-detailed areas. For the mouth, create the slit with DamStandard and build up the lips with Clay Buildup. To save time, at this point you can fill the eyes in to look closed. Add small details, such as facial hair, as well as any other key parts in your concept that best describe the character and personality, then save this tool.



Working with reference

Using reference is a great way to learn and bring that realistic factor to your sculpts. When using reference, disable Perspective to get rid of any distortion that may be affecting the model. If you don't have a second monitor, ZBrush has a new feature called See-through (top-right slider) which will reduce the opacity of the entire ZBrush window to see your reference behind. This can be extremely useful if you want to match your sculpt to the reference image with the utmost accuracy.

04 DynaMesh variations

Drag your history states back to the point where you have a generic head and neck shape, then build up your other two characters, saving them both out separately. You can now explore variations by editing the current three heads. Once each variation is done, drag back the history state to the original head and then make another version. Using history states like this enables us to work fast, so produce as many variations as you can.

05 Develop your sculpt

Now you have your variations, take a step back and have a good look at them. You can even walk out of the room briefly, as this will refresh your mind. When you return, you'll see all your sculpts in a new light. Choose your strongest design and start developing it using Move, Clay Buildup and Clay brushes, then pick DamStandard for details.

06 Final details

Introduce asymmetry to the character by using the Move and detail brushes to create more-realistic facial shapes, as nothing in nature is perfectly symmetrical. Try to add the key details without symmetry and add an expression from reference to give it more life (create this on a new layer to retain your previous sculpt). Polypaint by spraying down the deep skin/blood tones, then fill with a low-opacity skin colour.

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NutJob and the Node Editor

The improvements to the Joint tool, such as Projected Centering, will surely be welcomed by riggers

Autodesk Maya 2014

Jahirul Amin takes the newly branded Maya for a test run to see how the new features hold up

REVIEW BY Jahirul Amin, director/producer and associate lecturer at NCCA, UK

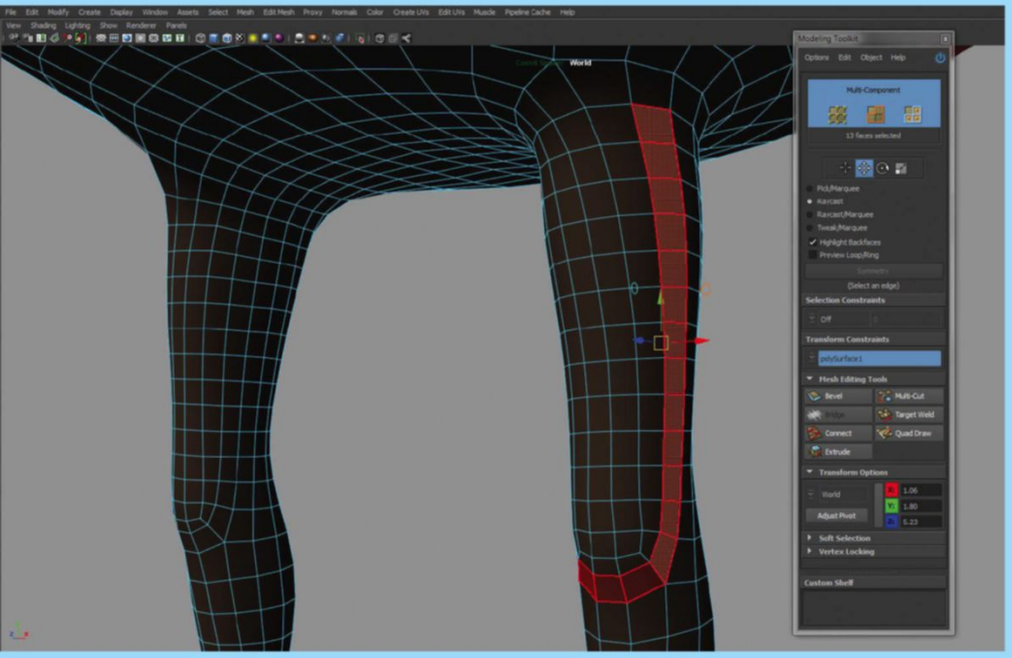
Traditionally I'm an arch sceptic of updates and new versions, so I was keen to discover if Autodesk Maya 2014 would impress or disappoint. I thought I'd model, rig and animate a simple biped character to discover what this latest version has to offer.

Regarding modelling, if you're familiar with digitalRaster's NEX plug-in, then you'll feel very happy to see it rehashed as the Advanced Modelling Toolkit and included as part of the package. This is a very valuable inclusion that I find increases productivity significantly, especially when it comes to retopologising a model.

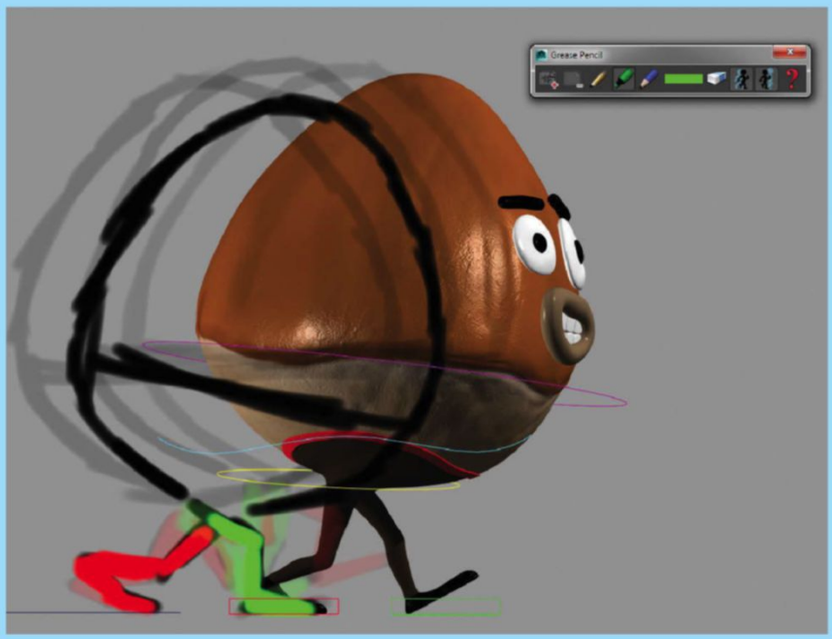
Some existing tools have also been revamped. For example, the Polygon Reduction tool, now named Reduce, has been re-engineered and does a surprisingly good job, where previously it produced some rather patchy results. The Crease Editor is a brand-new and very solid addition, which you can use to add defined edges without having to increase the resolution of the topology.

Moving on to rigging, the new features are mainly found in the Joint tool, with the Projected Centering setting automatically creating joints in the middle of the geometry, which is a neat little trick. You can also create joint chains with IK as a one-step process and establish symmetrical joints on the fly. However, I found that the latter facet wasn't as useful as it could be. Because I had to rename both of the joint chains after the creation process, it actually proved quicker to use the old method and create one side of the joints, name them and then use the standard Mirror Joint tool with the Search For and Replace With functions. There are scripts out there that will go through a joint hierarchy and rename it for you, but to have it as part of the package would be the cherry on the cake.

At this point, as we're coming to animation, I get to wax lyrical about the new Grease Pencil, which wiped the cynical sneer right off my face. As with different plug-ins and scripts available previously, this tool enables you to draw live in the viewport. As a result, you can jot down ideas on-screen, sort out your key poses, work out loose timing by animating your drawings and so on. I know this addition hasn't been greeted with universal enthusiasm, but for animators out there it's got to be a winner.



A fantastic new addition: the Advanced Modelling Toolkit



Finally we're able peacefully draw in Maya with the Grease Pencil tool

On to Paint Effects, which I find to be an underrated tool. To my mind it's a quiet achiever that you can always fall back on for any number of its tricks, so it's good to see it get some attention in this update. The new ability to collide objects with the strokes enables a whole range of new possibilities. The new features named Occupation Volume and Occupation Surface respectively enable you to fill objects and paint strokes more closely against a surface.

Viewport 2.0 has also had some positive changes. Running it in Direct X11 mode offers some fantastic results, so there's definitely something in it for videogames artists.

Additionally, you can now manage complex scene files more efficiently with the new scene assembly tools. The improvements to the Node Editor – which is almost a combination of the Hypergraph and Hypershade – mean that changes can be made visually and are less clunky.

All things considered, the latest version of Maya doesn't include many features that are revolutionary, because they were previously available somewhere out there as either plug-ins, scripts or as part of a different piece of software. However, to have them all together in one package makes Autodesk Maya 2014 a joyful little bag of tricks.

Essential info

Price: £3,200 (ex VAT)
$3,675 US

www.autodesk.com

OPERATING SYSTEMS

- Windows 7 or 8 Professional (64-bit)
- Mac OSX 10.7.x or 10.8.x (64-bit)
- Red Hat Enterprise Linux 6.2 W S, or Fedora 14 Linux operating system (64-bit)

MINUMUM SYSTEM REQUIREMENTS

- 64-bit Intel or AMD multi-core processor
- 8GB RAM
- 2GB of free disc space

The Viewport 2.0, in combination with Direct X11 shaders, will please many videogame artists as well as those who like to get a better representation of the final render

The good & the bad

- ✓ The Grease Pencil tool
- ✓ The new Advanced Modelling Toolkit
- ✓ Paint Effects improvements
- ✓ Project Centering in the Joint tool
- ✓ New tool tips for beginners
- ✗ Lack of improvements for mental ray
- ✗ Lack of optimisation for the UV tool

Our verdict

Features	9/10
Ease of use	9/10
Value for money	8/10
Quality of results	9/10

> A solid update to one of the industry's most prominent pipeline packages

Final Score 9/10

Finger Industries' recent promo, based on a photo taken by Rob Payne, with lots of lovely road signs

3ds Max 2014

Marcus Kenyon, founder of Finger Industries, takes a look at what benefits 3ds Max 2014 brings to his studio's CG pipeline

REVIEW BY Marcus Kenyon, founder of Finger Industries, UK

The first big thing to really shout about in the latest release of 3ds Max 2014 is the software's stability. It's this that the team at Autodesk have clearly focused on, rather than headline-grabbing features. That said, the new features are nevertheless impressive.

Crashes appear to be rare, so as a first release this bodes very well for the next year. Also the issues that plagued the initial 2013 release have so far not made a reappearance in this release.

We have been using 2014 in the studio for a month now and it feels like it's just a large product update (with some serious enhancements, granted), as it's so stable and refined. When we built our most recent promotional piece (*Hong Kong St*, see above) the first thing used was the Perspective Match feature. In previous versions, trying to match a camera to a background photo was a fairly tedious task and it was often difficult to get right. Now, with Perspective Match, you can load any image into the background and, using a simple technique, quickly match the angle of the photo.

This technique involves setting up pairs of X, Y and Z guidelines in the viewport to match key perspective markers on your background photo. Next you can create a camera as normal from the Perspective view. This is super-useful and accurate. One improvement could be to have more guidelines, so you can get even greater accuracy, as it sometimes requires mild tweaking to be spot-on. This is a minor issue though.

What's also noticeable is the significant enhancement to the Nitrous viewport, which can now handle a greater polygon count. Initially it wasn't obvious, but I suddenly realised that I had millions of polygons without any noticeable slowdown in the viewport, which is incredibly impressive.

Another new feature that's simple, great to use and very much needed is the 2D Pan and Zoom tool. Everything we produce requires a camera in the scene and one bane has been laying out elements from the Camera view. For example, during the making of the *Hong Kong* scene, we needed to make a drain cover lift up to place the wires into, therefore accuracy with the positioning was vital. The ability to zoom in from your Camera view without changing the perspective seems

Using the Perspective Match tool

The 2D Pan and Zoom tool will really help you position your elements accurately

small, but it's incredibly useful. This is just one of those features that gets used on pretty much every job.

When selecting tools, the new Global Search tool can be brought up using a hotkey. This tool can be applied to access virtually any tool or modifier within 3ds Max. This was previously available via a free script developed by Jeff Lim (from www.scriptspot.com) called activeType. Global Search expands on this functionality by including not only modifiers but all menu items. It's not without flaws, however, and can crash Max on occasion. It also lacks a history feature.

Thankfully, Autodesk has at last given us the option to have a different top menu bar, with a new thought-out layout called Enhanced Menus. I'm sure it won't be to everyone's taste, but it really works. The old legacy system has been built up as new features and options have been added over the years, so this update is heartily welcomed.

You can now opt for the menu bar to show icons, icons and text or just text, leave certain options open and shut or even drag out a copy and make your own floating favourites. You're also able to add your own menus, so the bar is very flexible.

However, we found the bar can be a bit unstable right now and it doesn't work with the dark UI (Autodesk has acknowledged this). We have also had all manner of bizarre errors with it, including occasions where two of our machines wouldn't open Max after making UI changes. Despite this, the change is excellent and I await the inevitable update.

Other new features that are worthy of a mention are the Populate feature, for adding autonomous humans, and the excellent mParticles. These small but effective additions add so much to Max and show that Autodesk has really been focusing on workflow issues and extras.

There are still things that we would like to see in the next release, such as a fluids solver for basic effects work and other minor workflow improvements. Plus there are a few small bugs floating around (which is to be expected with a piece of software of this size and complexity), but Autodesk's new Bug Submission form is simple, quick and straightforward to use if needed.

The bottom line is that this is a major and very positive release by Autodesk that bodes well for the future. It's definitely worth an upgrade from previous versions.

The Global Search dialog in full swing

Essential info

Price: £3,840 (inc VAT)
£2,688 (upgrade, inc VAT)

www.autodesk.co.uk

OPERATING SYSTEMS

- Windows 8 or Windows 7 64-bit Professional

OPTIMAL SYSTEM REQUIREMENTS

- 64-bit Intel or AMD multi-core processor
- 4GB RAM minimum (8GB recommended)
- 4.5GB free disk space for installation
- 3-button mouse
- Latest version of Microsoft Internet Explorer, Apple Safari, or Mozilla Firefox web browser

The good & the bad

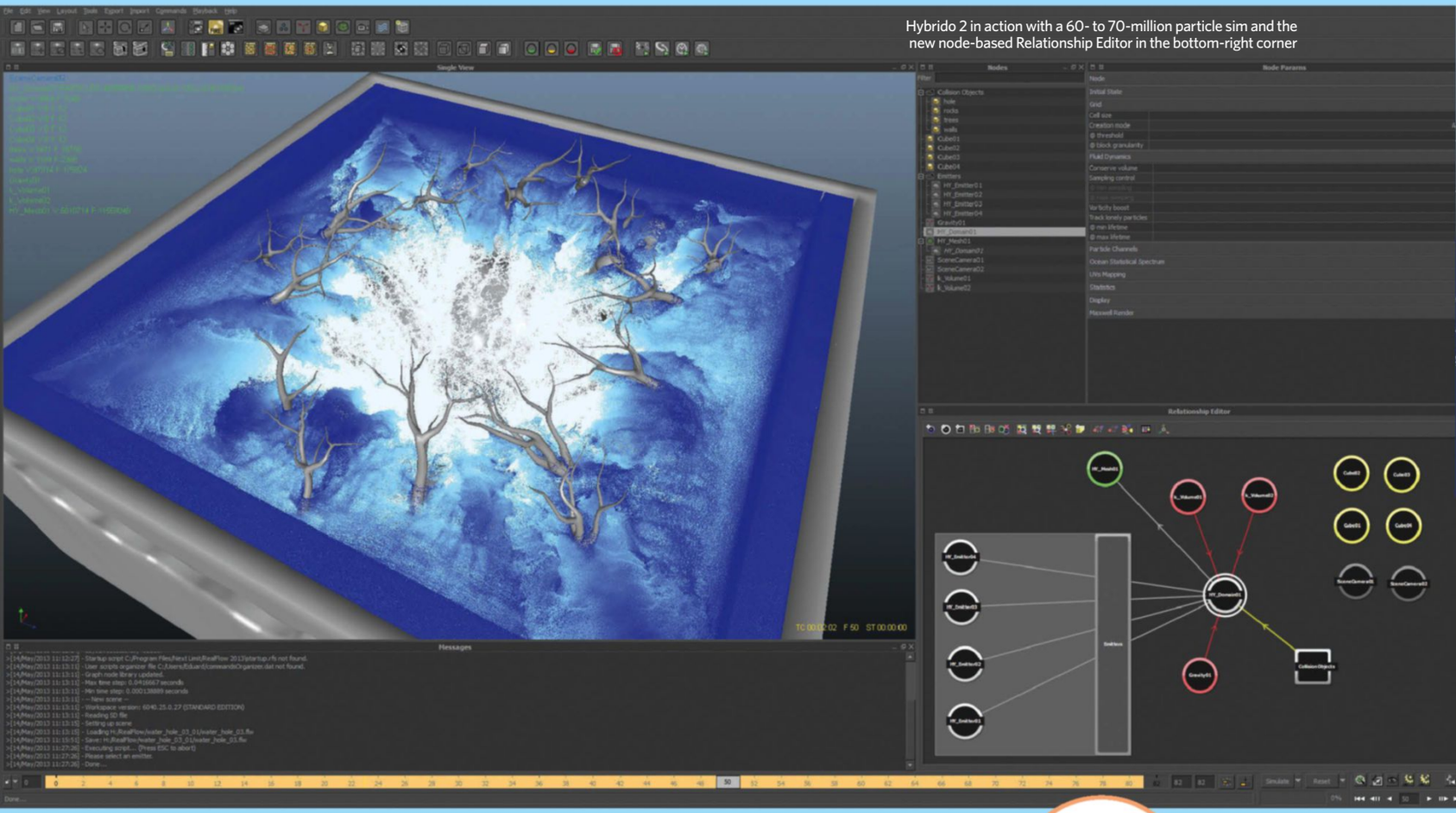
- ✓ Overall stability has been hugely improved
- ✓ Viewport performance is significantly better
- ✓ Enhanced Menus layout is more intuitive
- ✓ Global Search tool is a fantastic selection device
- ✓ mParticles capabilities
- ✗ Improved UI is good but still not coherent
- ✗ A few fundamentally basic bugs still irritate
- ✗ Expensive for lone/individual users
- ✗ Lack of a fluids solver

Our verdict

Features	8/10
Ease of use	7/10
Quality of results	9/10
Value for money	8/10

"A very worthy and capable update to an already high-quality piece of software"

Final Score 8/10



Hybrido 2 in action with a 60- to 70-million particle sim and the new node-based Relationship Editor in the bottom-right corner

RealFlow 2013

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With RealFlow 2013 finally out, has it started a fluid revolution?

REVIEW BY Eduard Schulze-Battmann, 3D artist, Italy

RealFlow is one software package that needs little introduction, since for years it has been an industry-standard fluid-simulation software. Ever since 1998, when the first version of the program was released, it has evolved a great deal, becoming more stable, powerful and easy to use. Due to technological progress and the increase in computing power, we're now talking about simulations containing several million particles instead of just thousands. RealFlow 2013 deals with this commendably, bringing a big range of new tools and features to the table that open up a whole new world of possibilities.

The most important and anticipated feature is Hybrido 2, a new grid fluid solver that's been completely rewritten from scratch and replaces the old version of Hybrido, introduced in RealFlow 5. Like Houdini and Naiad, Hybrido 2 is based on the FLIP solver method. The solution is a hybrid between particle- and volume-based fluid simulations. The big advantage to this approach is that it requires only a very small number of time steps, while an SPH system requires more than 10 to 100 time steps per frame in order to work without destabilising the entire system.

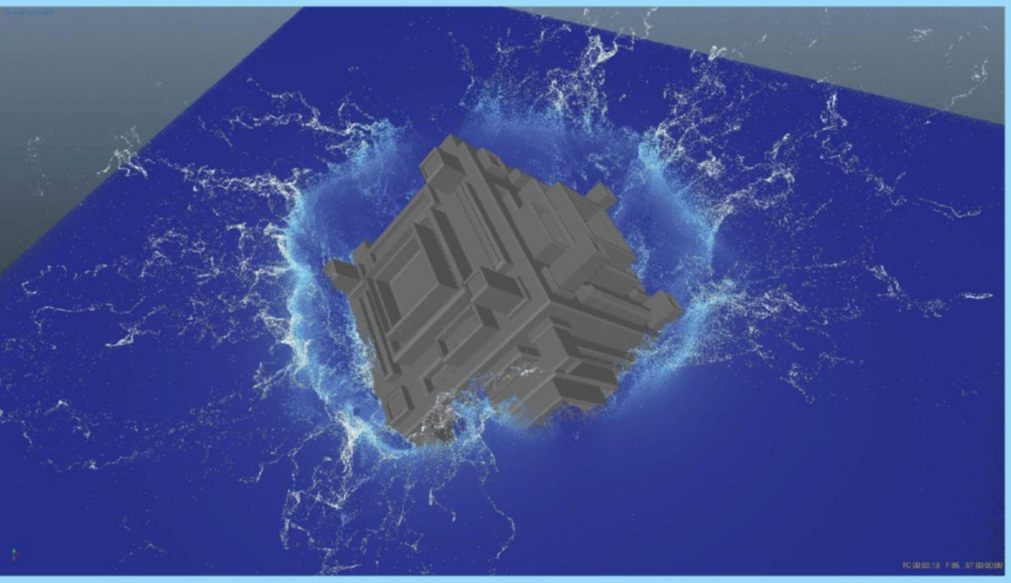
Since FLIP solvers are faster, running simulations with massive particle counts is not a problem anymore. With Hybrido 2 it's possible to work with a huge amount of particles along with a reasonable time per frame. When you start to work with the new Hybrido system, you'll also immediately notice that it doesn't use a closed and fixed domain anymore. Now you'll find the domain is automatically scaled and placed around the fluid's particle cloud.

Once your main simulation is finished, you can start simulating the secondary elements, which are computed using a new and faster SPH system called HySPH. Just like the old Hybrido, HySPH includes the capability to create splashes, foam and mist from the already cached simulation. Thanks to a new display option, you can also quickly preview where the splash or foam emission will occur.

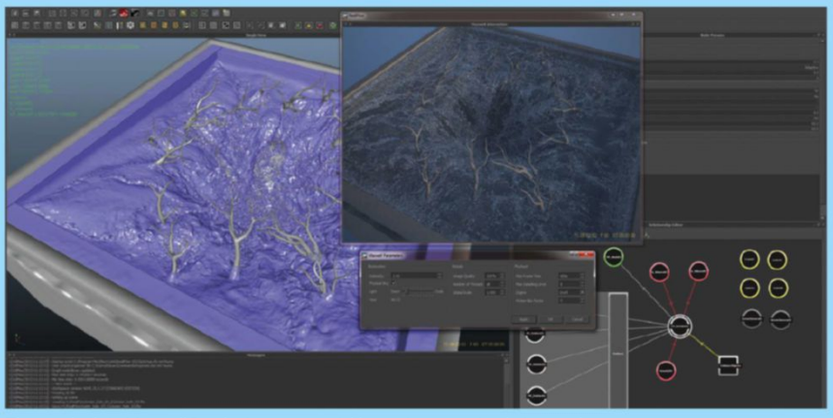
The new secondary emitters include just two particle types: Dumb and Liquid. The latter seems to provide better results and is much more accurate, even though it's slower than Dumb. This is because Liquid is a particle system that simply inherits velocity and direction from the main simulation without following any fluid dynamic rule.

By using Dumb you can get crazier splashes with a randomised look that can often be helpful to achieve chaotic scenes. However, after several simulations I can say that while the secondary emitters are in no way bad, neither are they the best I've seen.

Another feature worth mentioning is the built-in version of Maxwell Render. The ability to preview your simulation render in the background certainly comes in handy.



An example of a 10m cube falling at 15 m/s, containing 45 million particles. Made using Hybrido 2



The new built-in Maxwell Render is great to quickly preview your simulation render

If you also use RealFlow to simulate rigid and soft bodies, then it's also worth mentioning that Caronte is faster and more accurate than ever before and improved fracturing tools have been added.

A hugely important addition to RealFlow 2013 is the support of the Alembic open-source format developed by Sony Pictures Imageworks and Lucasfilm, something that has now been adopted by almost every software package on the market. With Alembic, particles and assets can be transferred along a studio's pipeline without any compatibility issues and without external plug-ins. This is a huge plus for RealFlow.

Another significant feature is the new node-based Relationship Editor. This totally replaces the old Exclusive Links system and enables the user to swiftly create all the nodes available in RealFlow, such as Daemons, emitters, objects and so on. Here you can also manage all the relationships between your project's nodes. If you aren't really comfortable with this, you can just ignore it and keep using the old workflow, since RealFlow will create all the necessary connections for you.

Simulation Graphs is another new option in the latest version. This is a very flexible node-based scripting system that enables instances to create a custom force field or any kind of effect you can imagine without writing a single line of code. This is thanks to the wide variety of node types available, ranging from basic maths to image processing. However, using Simulation Graphs can be initially difficult, especially if you aren't particularly comfortable with node graphs. Fortunately the included demo scenes can be very helpful if you get stuck with any such issues.

Considering all of these improvements, RealFlow 2013 is a big step ahead of its predecessor, and compared to its competitors it remains the easiest and most intuitive simulation software to use. However, some important features, such as density and viscosity, are missing in Hybrido 2. Also, when working with a very small voxel size and a high particle count, details can lose their definition.

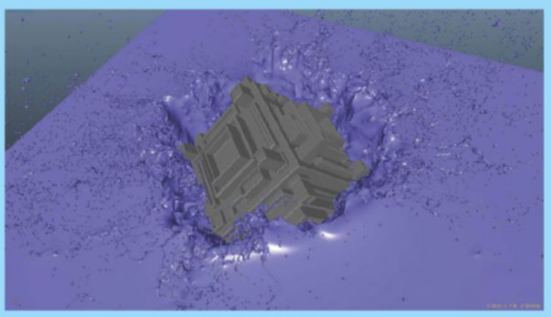
Still, considering Next Limit's track record so far, there's little doubt that the software will see these features included and will continue to be improved over the coming months.

Essential info

Price: $3,995 US
(approx £2,637)*
www.realflow.com

OPERATING SYSTEMS
- Windows XP, Vista or 7 (32- and 64-bit)
- OSX 10.5 and later (32- and 64-bit)
- Linux (64-bit only)

SYSTEM REQUIREMENTS
- 2GHz Intel Pentium 4 processor, Athlon 64 AMD or better
- 2GB RAM minimum, 4GB recommended
- Hardware-accelerated OpenGL graphics card
- 1GB available hard disk space for installation



A Hybrido mesh with default settings

The good & the bad

- ✓ Smooth learning curve
- ✓ Alembic file cache makes transfers easier
- ✓ A rewritten, detailed and faster grid-based solver
- ✓ Node-based workflow
- ✓ Included demo scenes
- ✗ Not always stable
- ✗ Details aren't always that impressive
- ✗ Very important features missing from Hybrido 2
- ✗ Simulation Graphs can be tricky to use for simple stuff

Our verdict

Features	8/10
Ease of use	9/10
Value for money	7/10
Quality of results	7/10

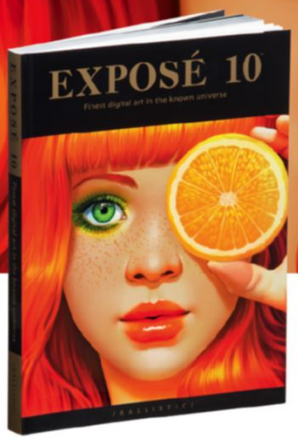
"Big improvements and new features make for a smooth learning curve, but the Hybrido 2 solver could be refined"

Final Score 7/10

*Price conversion correct at time of printing

EXPOSÉ 10

Image courtesy: Daniela Uhlig, GERMANY Red Orange



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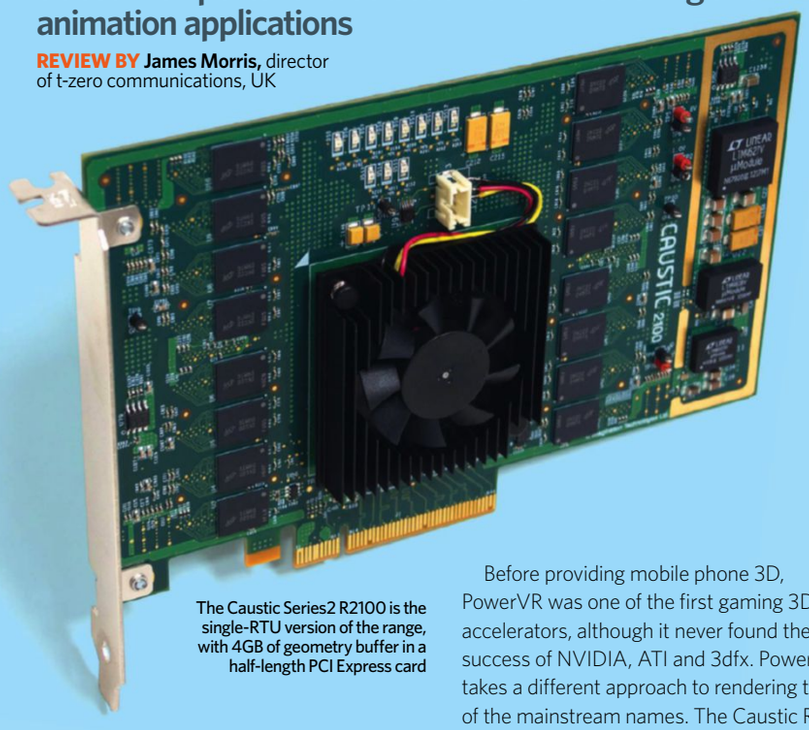
/ B A L L I S T I C /

Caustic Series2 R2100 + Vizualizer

Caustic's Series2 hardware provides accelerated ray-traced viewports for a selection of 3D modelling and animation applications

REVIEW BY James Morris, director of t-zero communications, UK



The Caustic Series2 R2100 is the single-RTU version of the range, with 4GB of geometry buffer in a half-length PCI Express card

Graphics-acceleration hardware has been enhancing the 3D content-creation workflow for over a decade now. But while you can get a pretty good idea of what a model will look like when rendering using OpenGL, the results will never be quite as realistic as a ray-traced version. This is where the light rays are traced from the source to the target object, with reflections calculated in between to provide the most realistic end result. While graphics cards from AMD and NVIDIA don't handle ray-tracing, Caustic Series2 is fully capable of this operation.

The Caustic story gets curious when you take a closer peek at the hardware spec. The R2100 version we are reviewing here comes with a single Caustic RTU (Ray-Tracing Unit) with 4GB of memory for scene geometry, or you can opt for the R2500, which comes with two RTUs and a whopping 16GB for scene geometry, but costs around twice as much. The R2100 is an eight-lane, half-length PCI Express card, while the R2500 is 16-lane and full length. The curious aspect is that the Caustic RTU is based on PowerVR, which you may even have in your pocket, as it provides the hardware 3D acceleration for a lot of smartphones.

Before providing mobile phone 3D, PowerVR was one of the first gaming 3D accelerators, although it never found the success of NVIDIA, ATI and 3dfx. PowerVR takes a different approach to rendering to all of the mainstream names. The Caustic RTU is based on a unique and patented technology from Imagination Technologies' PowerVR for solving the ray tracing problem, focused on the rendering of rays together to maximize efficiency. Additionally, the Caustic RTU stores shader materials such as texture maps in on-board memory, allowing the hardware to store very large models.

Once you've installed the Caustic drivers, you need to add the plug-in for your 3D software. The system supports 3ds Max and Maya, McNeel Rhino 5 Neon and PowerVR Brazil SDK, as well as OpenRL renderers and applications. We tried the system with Maya 2014, where the Caustic plug-in works through mental ray to render a viewport. We found we could only have one viewport set to use the Caustic system. As we moved the object the render temporarily degraded, but our Armari dual-Xeon test workstation was quickly back to full quality.

The Caustic Series2 R2100 is certainly effective, with great responsiveness and realistic ray-traced results. However, at $795 it's not cheap, especially when a decent OpenGL card will set you back far less. Nevertheless, if a responsive ray-traced viewport is key to your workflow, the Caustic Series2's abilities are unique.

Essential info

Price: £513 / $795 US*

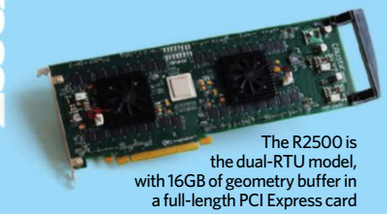
www.caustic.com

OPERATING SYSTEMS

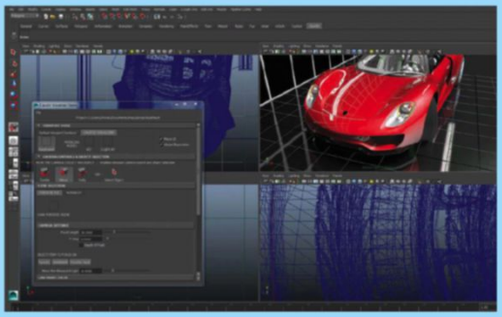
- Windows Vista and above (32- and 64-bit)

OPTIMAL SYSTEM REQUIREMENTS

- Single or dual Xeon SandyBridge, Westmere or Nehalem CPUs



The R2500 is the dual-RTU model, with 16GB of geometry buffer in a full-length PCI Express card



The Caustic plug-in for Maya accelerates a single viewport, giving you responsive interaction with the ray-traced render

The good & the bad

- ✓ Impressively realistic ray-traced viewports
- ✓ Fast rendering, which enables fluid interaction
- ✓ Plug-ins available for 3ds Max and Maya
- ✗ A bit expensive for single-use hardware
- ✗ Small range of compatible software so far

Our verdict

Features	8/10
Ease of use	8/10
Value for money	8/10
Quality of results	9/10

> If you could benefit from an interactive ray-traced viewport, the Caustic Series2 R2100 delivers the goods

Final Score 8/10

* Price conversion correct at time of printing

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RenPeng Dong

Personal portfolio site
www.oldrhyme.cgsociety.org

Country China

Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

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workspace 3D

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"We decided to represent the Amazon in a more chaotic way, through supersaturated colours and weird shapes"

Jorge Tereso discusses how he and the 3DAR team created an abstract Amazon that captures the chaos of the setting. Page 106

'Shave It'
3DAR
This vibrant animated short tells the story of one monkey's transformation, set against an incredibly colourful backdrop

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The next generation of Adobe products will be on the Creative Cloud

Adobe announces shift to Creative Cloud

Adobe shifts emphasis from packaged software as it launches new Creative Cloud of apps and services

At this year's MAX conference in Los Angeles Adobe announced a major change in strategy: the company has no further plans for Creative Suite releases beyond CS6. Also, instead of releasing boxed products along with perpetual licences, future releases will only be available via the online subscription-based Creative Cloud service.

CC releases will not require an internet connection to use, as programs run from the artists' computers, rather than the web. However, a connection is needed to download applications when released by Adobe, and for occasional server verifications to ensure that products are not pirated.

A subscription costs $49.99 per month and requires an annual commitment, granting access to the entire CC software suite. Subscriptions to individual CC applications are available for $19.99 per month. A special introductory offer is available for existing customers using CS3 or later. All CC subscribers will additionally get 20GB of free online storage. New social and management tools with CC will include group working, messaging and social networking from acquisition Behance. "We believe that Creative Cloud will have a larger impact on the creative world than anything else we've done over the past three decades," Adobe said in a letter to customers.

Creative Cloud sparks online protest

The move to the Cloud is riling up some of Adobe's rank-and-file. Customers are worried that the change will end up costing them more money and provide less control over their applications. The online backlash intent on reversing the company's decision is being spearheaded by a petition online at: www.change.org.

With CC Adobe has the flexibility to update as and when desired, getting new ideas to artists quickly rather than waiting for an update cycle to roll around

ILM to launch new real-time mocap tool

Kinect-based Instant Facial Performance Capture System to be presented at SIGGRAPH 2013

A YouTube video has surfaced revealing that Industrial Light & Magic has developed a propriety tool for real-time facial animation, with on-the-fly correctives using Kinect. Demonstrated on a laptop, an initial scan that captures texture and depth information from an actor's face in a neutral pose is taken. As the actor's expression changes, shape correctives that track the changes are faithfully applied. The results of the performance capture are shown to improve progressively during a capture session. This is because the PCA (Principal Component Analysis) is adaptive, including captured information from high-density Depth maps, texture features around the eyes and lips, as well as actor-specific nuances. These all result in greater expressiveness from the retargeted character. As with many real-time methods, linear subspace is used to deal with incomplete input data and fast motion. The paper will be presented by Hao Li, Jihun Yu, Yuting Ye and Chris Bregler at the 40th SIGGRAPH 2013 Conference.

You can see this new technology in action www.tinyurl.com/3DAILMFacialCapture. We can't wait to see what else SIGGRAPH has to offer

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Animator's Survival Kit

To honour Richard Williams' 80th birthday, Faber Digital brings The Animator's Survival Kit to iPad

First released as a book, then as a DVD training set, Richard Williams' best-selling *The Animator's Survival Kit* has now been released in iPad app form. It contains the complete expanded version of *The Animator's Survival Kit* book, as well as over 100 animated examples taken from *The Animator's Survival Kit Animated* DVD box set. The animated examples can be accessed via a menu button or a filmstrip icon on pages where the example is demonstrated. Videos can be played, scrubbed through, viewed frame-by-frame and set to looped playback. Many of the videos also have an onion-skin feature, letting you view ghosting of previous animation frames too. The Extras menu contains previously unreleased animations by Williams called Circus Drawings and Silent Film. The intro animation is an animated version of the book cover that was originally made for the DVD box set.

The animated introduction took Richard Williams nine months to animate

Will EA do a good job on the new *Star Wars* games?

The force is with EA

EA to develop and publish new Star Wars games

The announcement of the new deal comes after Disney issued staff cuts at LucasArts and ceased internal development. "[The deal] demonstrates our commitment to creating quality game experiences that will drive the popularity of the *Star Wars* franchise for years to come," said Disney Interactive co-president John Pleasants. "Collaborating with one of the world's premier game developers will enable us to bring an amazing portfolio of new *Star Wars* titles to our fans." Disney has retained the rights to develop titles for mobile, social, tablet and online categories.

Pioneer Ray Harryhausen dies aged 92

The creative innovator worked on some of Hollywood's greatest monster movies

Medusa from 1981's *Clash of the Titans* is among legendary animator Ray Harryhausen's many creations

The stop-motion maestro and model-animation trailblazer was – and will continue to be – a key inspiration for filmmakers.

His work on movies such as *Clash of the Titans*, *Jason and the Argonauts* and *The Golden Voyage of Sinbad* had a huge impact on the industry and will be remembered by cinema fans forever.

Influenced by *King Kong* as a child, Harryhausen's creations went on to become a major influence on many of the biggest filmmakers of today, including Tim Burton, James Cameron, Steven Spielberg and George Lucas.

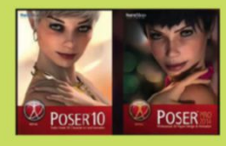
Software shorts

Bringing you the lowdown on product updates and launches

e-on software Vue 11.5 xStream and Infinite

e-on's digital environment application has received feature and interface optimisations based on production feedback. Colour channels can now be edited from its Post Render options. EcoCollision now supports EcoParticle collisions with EcoSystem instances. Material Management, World Browser and Camera Management have all received enhancements too. This upgrade is free for users under maintenance. Visit www.e-onsoftware.com for more.

Poser 10 and Poser Pro 2014



Both Poser 10 and Pro 2014 have gained Bullet Physics, which simulates rigid-body dynamics, soft-body dynamics and dynamic strand-based hair. Pixar Subdivision Surfaces now have definable subdivision levels per-prop, figure or body parts and a Unimesh skinning method for subdivided figures. Go to http://poser.smithmicro.com/poser.html to learn more.

Blender 2.67

The latest version of Blender includes a non-photorealistic rendering engine called Freestyle. This enables artists to generate 2D line drawings from 3D scenes for technical drawings and cartoon images. Other highlights include a subsurface scattering shader for the Cycles renderer, a 3D-printing add-on, updated motion-tracking and compositing tools. There have also been over 260 bug fixes made. Head over to www.blender.org to download the software for free.

Stoke MX released

Thinkbox Software releases Stoke MX Particle Reflow tools for Autodesk 3ds Max

Stoke MX is a plug-in that integrates with 3ds Max to provide accelerated high-density particle cloud-creation, driven by Velocity Fields. Supported sources include simulations from FumeFX, Thinkbox's Ember plug-in, Particle Flow, Cebas thinkingParticles, 3ds Max Push Space Warps and PRT, as well as RealFlow BIN. "Instead of being stuck in a rigid and linear simulation workflow, artists can layer their particles and work backwards to mix, enhance or alter simulation data quickly and easily without having to resimulate," says founder Chris Bond. Visit **www.thinkboxsoftware.com**.

The Stoke MX plug-in generates particle clouds for 3ds Max

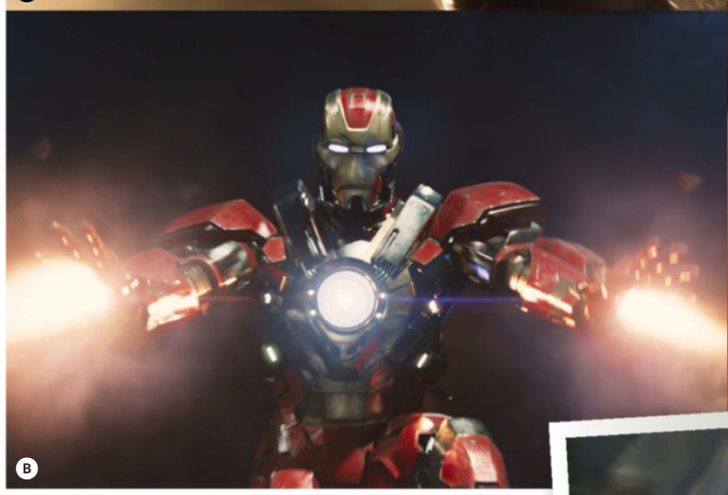
● **DID YOU KNOW?** ▪ IBM scientists have created the world's smallest animation, 'A Boy and his Atom'

Studio Access

Rescuing Iron Man 3

How Cinesite provided VFX support for Marvel's epic superhero sequel

A


B

During the climax of this summer's superhero blockbuster *Iron Man 3*, brash-but-brilliant billionaire industrialist Tony Stark finds himself in a precarious predicament. Hopelessly backed into a corner by the attacking enemy, Stark calls in an armoured squad of Iron Man suits for urgent assistance. It's a fraught situation that powerhouse VFX studio WETA found itself relating to. Scrambling against the clock to finish crafting the film's final battle sequence, help came in the form of digital effects house Cinesite. The studio was employed in the eleventh hour to aid in the completion of the epic action-packed finale.

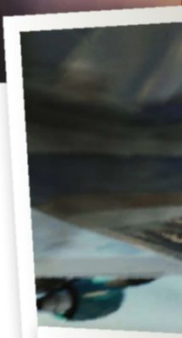
"I think what happened was that sequence grew and WETA wasn't able to complete it," Simon Stanley-Clamp, VFX supervisor at Cinesite, explains. "or nine weeks we worked on just over a hundred shots that spread across seven sequences. The main sequence is the beginning of the final battle of the movie, which takes place at the docks. We completed the front end of that sequence."

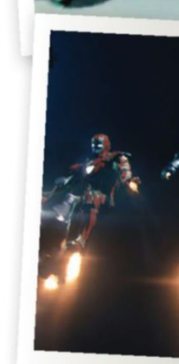
To ensure it fully met the film's impending release date, Cinesite inherited the majority of the models and textures from WETA studio. "We did our own layouts, lit them ourselves and flushed those through our pipeline," explains Stanley-Clamp. "The data and textures we received from WETA slotted in neatly, but we were still tracking all our own plates and doing the layouts. The layouts were based on drama footage and live-action footage of surrounding shots, as well as some finals that WETA had. The process was a combination of full digital environments, with live action nestled back into it. Then there was the inverse of that, with a greenscreen foreground and CG nestled in behind it."

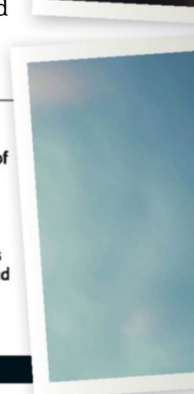
> "For nine weeks we worked on just over a hundred shots that spread across seven sequences"
> **Simon Stanley-Clamp, VFX supervisor, Cinesite**

As any artist will tell you, coming into a project late in production is never easy. But despite a few thousand miles and several time zones separating New Zealand-based WETA and Cinesite's London offices, the collaboration between the two studios was seamless.

"Cinesite came in very late on a project that had already been ticking over with other facilities for a year, where they had their pipeline and naming conventions set and had their processes for dealing with dailies. It was tough having to be up-to-speed with that within days," says Stanley-Clamp. "Really, full credit goes to Marvel Productions. Chris Townsend (visual effects supervisor) was incredibly giving and always available for doing dailies and cineSync sessions with us. They were doing projected dailies twice a day, so the rate of feedback was faster







CINESITE
A KODAK COMPANY

Cinesite is one of the largest and most creative VFX studios operating today. It first established its Los Angeles offices in 1991, but now operates out of its London headquarters. The award-winning team has produced visual effects for HBO's *Band of Brothers* and *Rome*. It managed stereoscopic 3D conversions for *John Carter* and even won an Academy Award for its work on *The Golden Compass*.

www.cinesite.com

Project *Iron Man 3*

Description Following last year's *Avengers Assemble*, *Iron Man 3* finds Tony Stark suffering from panic attacks after his brush with death. To make things worse, a series of escalating threats from an elusive terrorist known only as the Mandarin is further threatening Tony's world.

Country UK

Software used RenderMan, NUKE, SpeedTree

Contributors

Simon Stanley-Clamp
VFX supervisor

Portfolio highlights

Here are some of the big-budget movie projects Cinesite has worked on:

2013 *World War Z*
2013 *Iron Man 3*
2012 *Skyfall*
2012 *The Avengers Assemble*
2011 *Battle: Los Angeles*
2009 *Moon*
2008 *The Dark Knight*
2007 *The Golden Compass*
2001 *Band of Brothers*

A While *Iron Man 3* was a relatively short project for the studio, Cinesite has previously supplied VFX for other major Hollywood blockbusters such as *The Golden Compass*, for which it won an Academy Award

B The third film in the *Iron Man* franchise features over forty different battle-ready suits that are used in the film's climatic battle sequence. WETA studio painstakingly created each individual design

C The quick turnover was unique for Cinesite. "Everything was live all the time," says Stanley-Clamp. "On a long-term project you tend to shut shots down and know that they've been bagged"

D When asked whether Cinesite designed any of the multiple Iron Man suits seen in the film, Stanley-Clamp responded: "We were scheduled to and it was on and off, but in the end we didn't"

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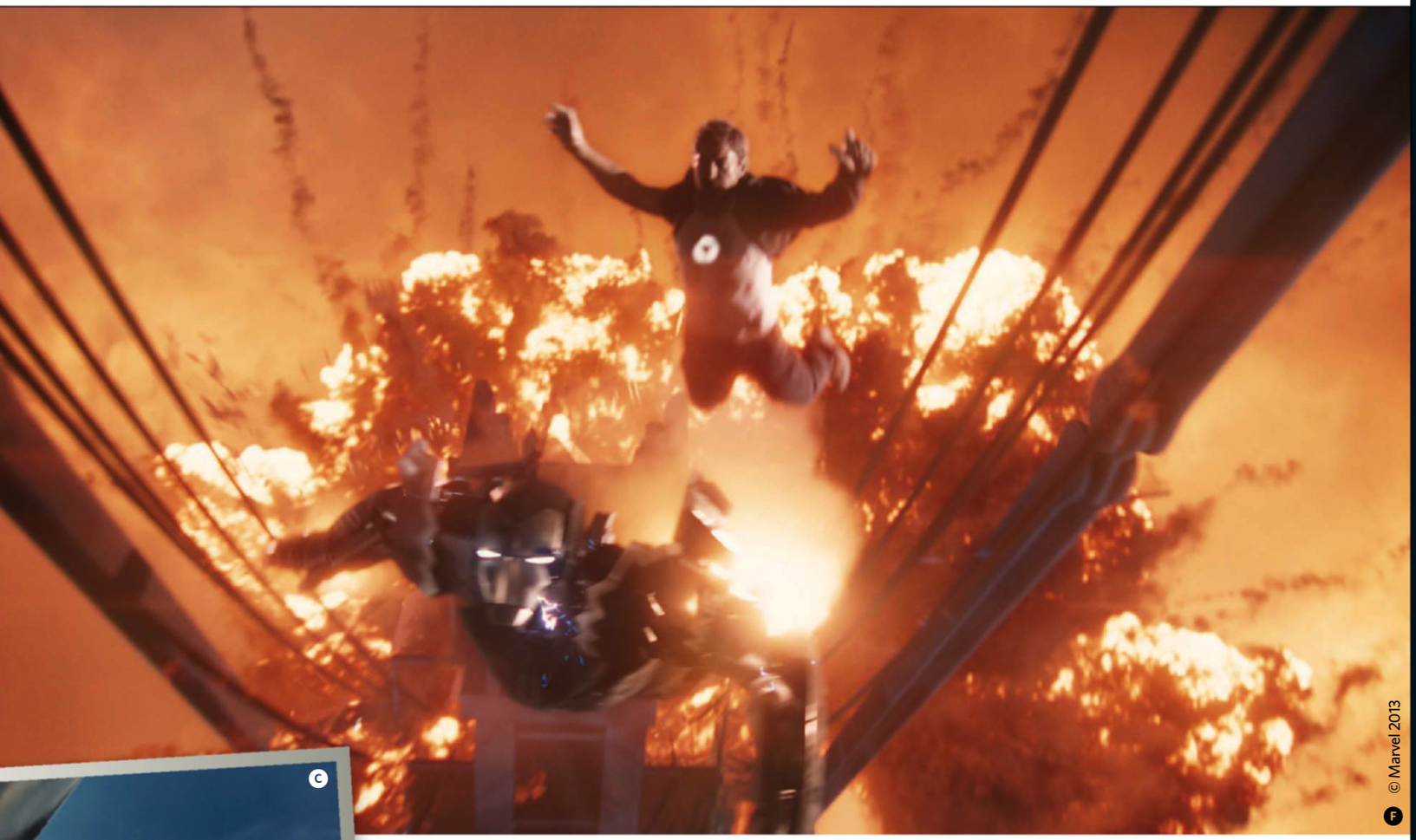

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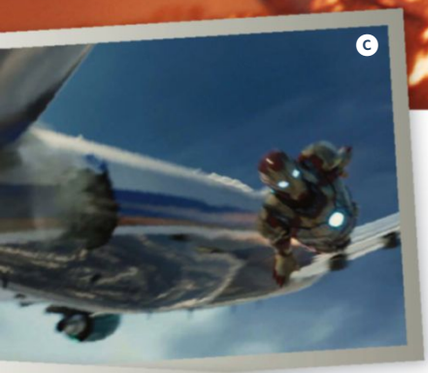

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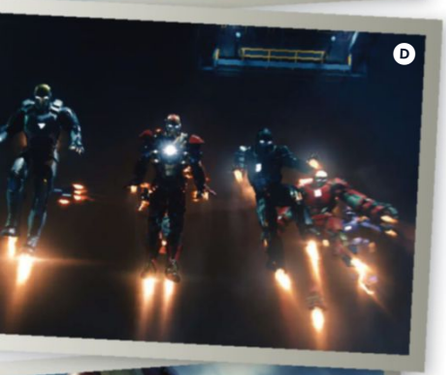

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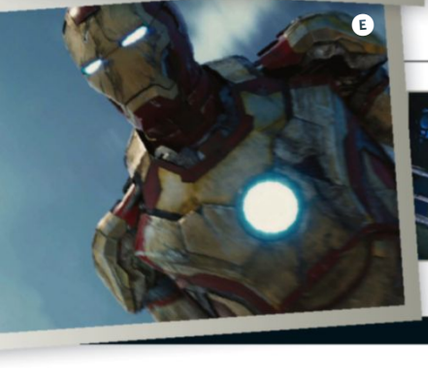


E

than we've ever had from any client. Even when we've had clients in the building or in the country here, the process has never been that instantaneous."

It also helped that Cinesite dedicated an internal department to creating environments, which proved instrumental in constructing the final sequence set in a dockland. "We had quite a lot of environments to do," explains Stanley-Clamp. "This meant we had a dedicated crew of matte painters and generalists who could produce 3D layouts and 3D projections. They could then hand off near-completed environments to the compositors. The docklands scene is full of massive machinery – big cranes and ships – and it was getting that scale right, sourcing and generating good shaders, that made it really convincing. Making things look big isn't easy!"

After a hundred shots in just nine weeks, ranging from composites to digital matte paintings and full CG environments, Stanley-Clamp is proud of Cinesite's work on its first Marvel film. "It's lovely to do a run of shots when you get 40, 50 or 60 shots back-to-back and they're all cut together," he beams, before offering final advice for budding VFX artists: "For us at Cinesite, it's just about keeping it small, keeping the communication lines quick and open. Talk about shots, review them a lot and try not to overwork things."

Familiar tools

Cinesite's reliance on common tools proved fundamental in delivering the project on time, as Simon Stanley-Clamp explains

"We didn't do anything fancy, to be honest. That was the mantra: to do what we know we can do. Recently we've been experimenting with using V-Ray on things, but we didn't use V-Ray on this. We went with a RenderMan pipeline because we know it's robust and it would work. Although, for one shot we used SpeedTree to repopulate and re-cultivate the surrounding terrain, so that was kind of new to the pipeline. We've done a couple of tests and test shots internally, but before then had never used it on a show."

G

E "As soon as you see it you know it's a Marvel film," says Stanley-Clamp on the VFX's consistency "It's a rich palette – saturated blues and very dark blacks. It's a look that stands alone with any Marvel film"

F "For a handful of shots we used NUKE's deep compositing techniques to layer up the smoke. We built an effective but probably very overcomplicated way of layering up the smoke," states Stanley-Clamp

G "You need detailed textures. You've got to have small rivets and really convey that scale with a nice level of detail," Stanley-Clamp says of the miniscule environmental detail in the docklands sequence

Project Focus

'Shave It'

Wacky colours and tongue-in-cheek parody come together to bring a serious eco issue to the screen

Project 'Shave It'
Description A vibrant animated short that tells the story of one monkey's transformation into a human, his rise to the top and the slightly unorthodox way he seeks to avenge the destruction of his jungle.
Company 3DAR
Country Argentina
Company bio 3DAR is a multidiscipline design studio that covers everything from the concept through to the final work. For over eight years it has worked with major clients such as Microsoft and Sony.
Website
www.3dar.com

A strong environmental message, a dash of humour, an electric shaver, a psychedelic colour palette and a monkey protagonist that never says a word. All in just four minutes.

It's difficult to imagine these things ever working together, let alone in an animated short. But Argentinean design studio 3DAR clearly has no problems when it comes to imagination – or the skills to turn an off-beat vision into reality.

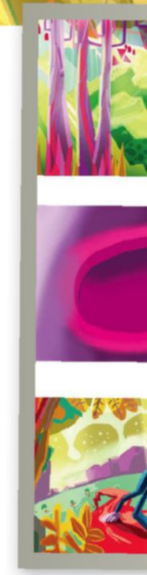
'Shave It' begins with a monkey whose jungle home is being torn down by bulldozers. With around 12 football pitches of Amazonian rainforest being cut down in the time it takes to watch this movie, it's no wonder 3DAR wanted to highlight the issue. Argentina-based co-writer and co-director Jorge Tereso explains: "Many of us have a deep relationship with the Amazon. It's being treated as a resource rather than the lungs of the planet. The defence of nature kick-started this project, but almost unwittingly 'Shave It' ended up becoming a wider critique on humanity."

Stumbling across an electric shaver, the monkey makes a life-changing decision: to cut off his hair and become a human. For a character that never speaks, his identity is expertly expressed. Tereso puts this down to the team recognising their limitations: "No one will ever be able to really animate a monkey the way nature does. That's why we were inspired by them but never tried to copy them. We aimed for an intense personality."

This sense of real life with a twist is a theme the short maintains throughout, perhaps nowhere more notably than the vibrantly coloured rainforest and cityscape environments. Tereso attributes the spectacular settings to art director Marina Muñoz: "All we needed to do was to project the drawings onto 3D geometry."

While some animators go to great pains to re-create lifelike textures, again the team chose a different path. "From the start we had a concise objective: to merge the 3D world with our 2D drawings, so we didn't really use complex textures. We got obsessed with colour. We put a lot of energy into achieving expressive lighting that conveys each moment of the story just right."

A



On this quest for atmospheric lighting – "redone about 15 times for each shot" – V-Ray was 3DAR's weapon of choice. But more often than not, the team took a more hands-on approach. "Instead of relying on plug-ins, we'd look for people to do scripts, like Vincent Souza," Tereso reveals. "He developed the rig and many scripts for controlling the monkey. When faced with complex elements like hair or particles, we chose more direct methods such as 2D animation. We even produced hand-drawn motion blur."

Many concepts didn't make the final cut, but Tereso doesn't believe anything was wasted. "Hundreds of monkeys were drawn before finding the right one; it was almost like a game. Sometimes you have to get it wrong 50 times before the good things show up."

> "Sometimes you have to get it wrong 50 times before the good things show up"
> **Jorge Tereso,** co-writer/director, 'Shave It'

B

A key inspiration behind the short's styling was a Japanese anime film. Tereso explains: "While writing the script, we saw the movie *Mind Game*. From that moment on we started imagining 'Shave It' in a different way. We became friends with the abstract"

B When asked if the inquisitive monkey character in 'Shave It' might make a comeback in future 3DAR projects, Tereso isn't enthused: "Many exciting things are on their way, no doubt, but we think the monkey has already said what he wanted to say"

Contributors

Jorge Tereso
Fernando Maldonado
Co-writers, co-directors

workspace[3D]
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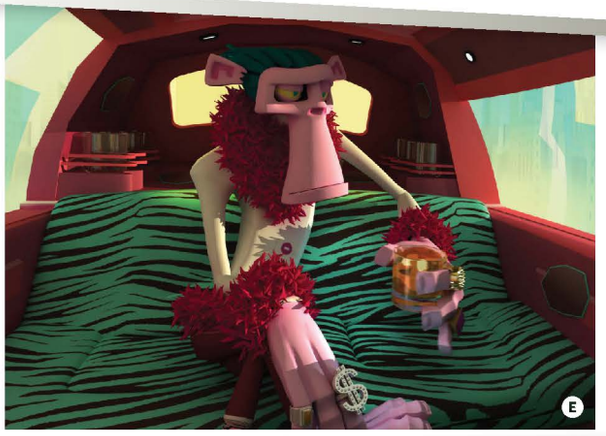
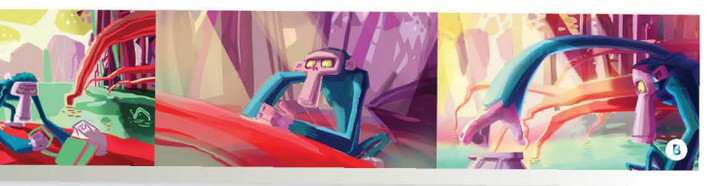
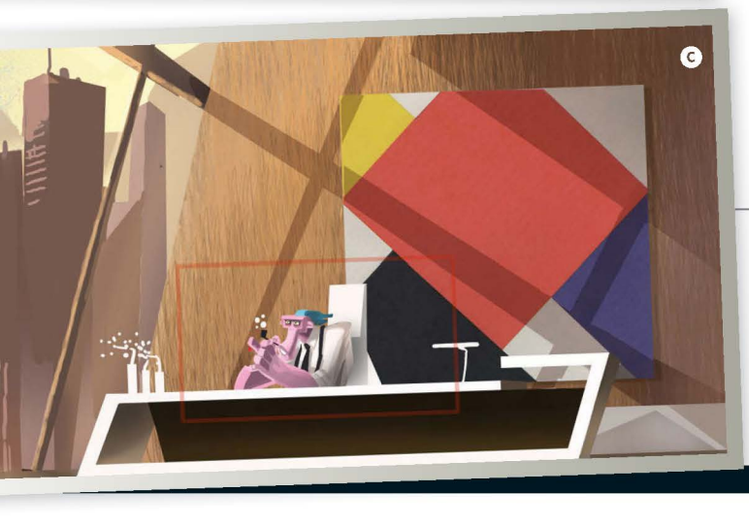






Strange but true

The scenery in 'Shave It' leaps out of the screen with its rich tones. Defining the colour palette was a turning point for the team

3DAR knew it wanted to make 'Shave It' for some time, but struggled to pin down its aesthetic. Tereso explains: "The idea was very visual from the start. At first, we couldn't find a way to write the script without losing the dynamism of the movie. With the storyboards we got closer, but the day we nailed the colour script, the entire short came to life." A quick trip to the jungle pushed them towards the surreal path. "Right before production, we travelled to the Amazon. If we'd taken a camera, not even ten per cent of the real experience would have been captured, so we decided to represent it in a more chaotic way, through supersaturated colours and weird-looking shapes. A realistic representation wouldn't have delivered the same effect."

Over the course of the film, the main character goes on an epic journey from a monkey, to an organ-grinder living the playboy lifestyle – and even on to president. 'Shave It' is a lesson in life as much as it is animation. It just goes to show what can be achieved with an idea, a lot of hard work and the belief to see your goals through. And all this in just four little minutes.

C On the monkey's energetic and sporadic personality, Tereso says: "They do say that behind every animator there lies a tiny frustrated actor, so sometimes the animation is a result of that expression coming to life through the characters"

D The team's affinity for the Amazon rainforest and its rate of deforestation (over three football pitches every minute) was what inspired them to make the movie. However, by the end the team realised 'Shave It' was a wider critique of humanity

E The team injected their own brand of humour through their depiction of the stereotypical business tycoon, embracing the playboy lifestyle of speedboats, limousines and space tourism. But then the monkey has an epiphany...

Industry insider

Against all the odds

Art director/3D artist

Lilit Hayrapetyan is not only a talented 3D artist, her inspirational story also shows what can be achieved when you're truly passionate about CG

About the insider

Job Art director/3D artist
Education Yerevan State Academy of Fine Arts
Website www.lilithayrapetyan.com
Biography Lilit Hayrapetyan is an art director and 3D artist born in Armenia. During her early student years she worked at a leading motion design house in Armenia, named Triada Studio. Ten years later, Prologue invited her to work at its creative house. She currently lives in Los Angeles and works at Psyop as its art director.

© Prologue

Many successful 3D artists have worked hard to get to where they are today, but in 1980s Armenia Lilit Hayrapetyan perhaps faced tougher challenges than most.

Hayrapetyan's prohibitively young age presented her first obstacle to a life of art: "When my brother wanted to enter art school I cried because I wanted to go too! I was three and they only accepted kids of five years old. Nevertheless, I was allowed to do the test, so I passed and attended for the next 12 years." This early achievement foreshadowed the success to come.

When employed by Armenian design house Triada Studio aged 19, Hayrapetyan faced the challenges of learning 3D in a country with few opportunities and a severely undeveloped industry. Back then art companies were sparse, electricity was available for only a few hours a day and language presented a constant barrier. "I had an English book, a candle and an English-Russian translator," she says of her educational process.

However, these limitations proved to be no match for her ambition, with Hayrapetyan learning "how to do modelling, lighting, texturing, animation and rendering, as well as design" completely unaided.

Upon discovering 3ds Max at Triada Studio, Hayrapetyan found her true calling. With this passion came opportunity and some life-changing decisions. A true inspiration and example of what can be achieved if you push yourself to reach your goals, here she explains how it's done.

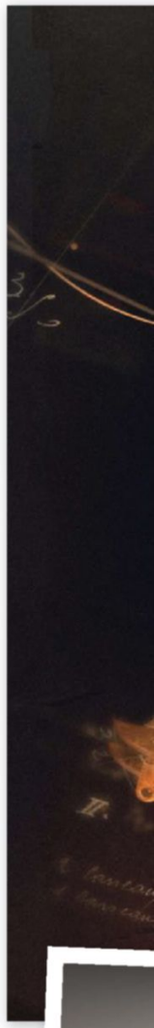
Tell us about yourself and your history as an artist.
I was born in the beautiful city of Yerevan, Armenia. When I was four, I started taking art classes and had a great teacher who played a huge role in influencing my creative development. I did ceramics, sculpting, traditional drawing, contemporary art and eventually studied Design at Yerevan State Academy of Fine Arts. During the third academic year, aged 19, I had an offer from Triada Studio to study 3D and work at its motion graphics company.

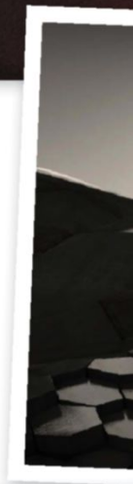
What was it like studying 3D in Armenia? What challenges did you face?
Back then there were no animation or 3D schools in Armenia and only a few people could afford home computers. However, I was fortunate enough to get an offer from Triada Studio to study 3ds Max after school. The internet wasn't full of tutorials like it is now; the main source of learning was books in English, which is my third language.

What are your main skills as a 3D artist?
My favourite part of the creative process is developing the final look with lighting and shading. I like using 3D art to create something surreal; something that doesn't exist in real life. The only thing I'm not comfortable doing is character animation. I'm always asking myself the same question: 'Do I not enjoy it because I don't do it well, or do I not do it well because I don't enjoy it?'

Please discuss your move from Armenia to LA. How did you achieve this huge change in your career?
It was a difficult decision to begin a new life in the US. However, Prologue invited me for two months to see if I liked it there first and to see if I was right for the studio. It was a great opportunity to see the huge differences between our two cultures and working processes before moving. My first big project was on the MTV Music Awards, which was very inspiring for me. After working for two months with some of the best artists on the planet, I didn't hesitate to move.

You now work at Psyop in LA in the role of art director. What does this role entail?
When Psyop interviewed me, I was asked: "You can do almost everything, so what kind of position do you





Overcoming the language barrier

Hayrapetyan discusses the difficulties of learning complex 3D software in a foreign language

"It's very difficult learning programs in English when it's your third language. During my first year of learning, all I had was a huge book of 3ds Max in English and an English/Armenian translator. Of course, learning 3D programs in this way helped to improve my English too."

Portfolio highlights

Some recent features that Lilit Hayrapetyan has worked on:

2012 *Droid Verizon commercial*
2012 *Panasonic commercial*
2012 *Jim Beam commercial*
2011 *Final Destination (title design)*
2011 *Sherlock Holmes: A Game of Shadows (title sequence design concept)*
2011 *The Amazing Spider-Man (VFX design concept)*
2011 *AT&T commercial*
2010 *Spider-Man Turn Off The Dark musical – Broadway*
2009 *MTV Music Awards commercial branding*
2007 *Nemiroff Vodka commercial*

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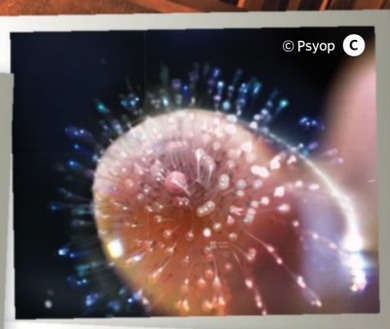

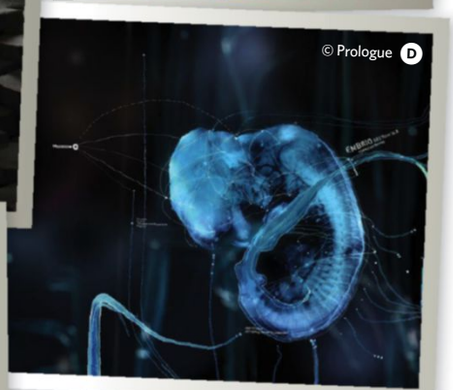

want?" Since I mainly enjoy the creative process, I replied that I'd love to design using all my 3D skills. So I work a lot on pitching, which I really enjoy.

What advice would you offer to artists in similar situations to the one you were in?
When you're truly inspired and love what you do, believe in your abilities and never stop exploring or learning new things. You can always do more than you think is possible.

> "When you're truly inspired and love what you do, believe in your abilities and never stop exploring or learning new things"

A Created at Psyop, this is a style frame for the 'Red Stag Breakaway' Jim Beam commercial. The colours were picked to present the honey and cinnamon flavours

B Created at Psyop, this fascinating DNA concept was used in the futuristic 'Droid Verizon' advert for HTC. Hayrapetyan added art direction to the piece

C This is another concept created at Psyop, which was used in the 'Droid Verizon' advert for HTC. Hayrapetyan particularly enjoys creating bizarre, surreal art

D This embryo-like creation is part of the holographic tree of life created at Prologue. It was used as part of the VFX for *The Amazing Spider-Man* movie

E The mixture of texture, photos, illustrations, animation and calligraphy made the *Sherlock Holmes 2: A Game of Shadows* opening credits a success

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VFX Fundamentals Program

Course length 36 weeks

Fees $7,597 for 36 weeks of education, broken into three separate classes: CG Basics ($1,999 for 12 weeks), Lighting Basics ($2,799 for 12 weeks), and Compositing Basics ($2,799 for 12 weeks). A $75 registration fee and a $99 lab fee apply for all three classes. There is no application fee

Student requirements
A background in art or photography is helpful, but not required. A PC is needed for the VFX curriculum

Website
www.animationmentor.com

Animation Mentor's VFX Fundamentals Program teaches students the essential generalist VFX skills and foundations to develop as a technical artist.

Students team up with cross-discipline artists and work with the patent-pending AMP Studio Production Pipeline to become familiar with a modern asset-based workflow.

The school's founders began by asking themselves how they would want to learn if they started from scratch. The answer can be found in the details of the programs they've created, which are delivered online and unite students with the industry professionals that will mentor them.

The VFX Fundamentals course is 36 weeks broken into three separate classes: CG Basics, Lighting Basics and Compositing Basics.

In CG Basics, students learn the foundations of cameras, modelling and surfacing, before progressing to lighting and compositing. In Lighting Basics, students take the skills learned in CG Basics and learn how to convey an idea centred on visual storytelling using light, shape and colour. Compositing Basics lets students work with a mix of live-action and CG elements to provide a critical understanding of the complete production process. As compositing has become the focal point of many studios and the production process as a whole, this component is an invaluable addition to the course.

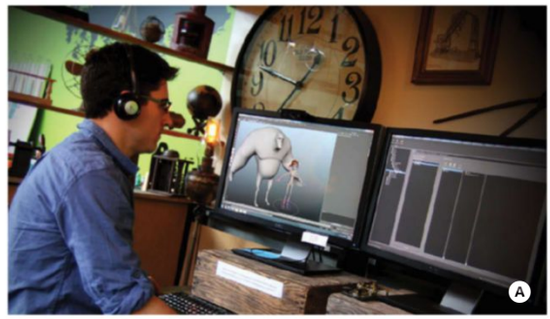
As well as the tools students get access to – such as three-year active student access to Maya as well as access to The Foundry's NUKE and Solid Angle's Arnold renderer – there is also the opportunity to get one-on-one direct feedback from award-winning lighting and VFX artists. This means that the skills you develop match what studios are looking for.

> "No one is doing anything like this, or at this scale"
> **Bobby Beck,** CEO and co-founder, Animation Mentor

Details

Ben Fischler - VFX Curriculum

Fischler has worked on films such as *Madagascar*, *Over the Hedge*, *Shrek 2* and *Shrek the Third*. He's been in the animation and VFX field for 15 years, most recently as VFX supervisor at LAIKA and prior to that in the Lighting and Compositing department at DreamWorks Animation SKG. As Animation Mentor's visual effects curriculum director, Fischler partners with other departments to develop coursework, secure mentors and promote the program.


A

B

C

D

E

A *AMP Pipeline*
» Animation Mentor
Workstations in any internet-enabled location can connect to the new AMP Studio Production Pipeline, so project teams can be spread over great distances

B *Fruit Bowl*
» Ben Fischler
Ben Fischler demonstrates the kind of photorealistic lighting, surfacing and compositing students will learn across the three classes of the program

C *Beta Testing*
» Kimi Owens
For this Beta-testing work, student Kimi Owens did the UV-wrapping, moved to the Arnold Renderer and then composited her EXR with a BG plate inside NUKE

D *Dinner*
» Shannan Taylor
2012 student Shannan Taylor demonstrates how lighting and colour can evoke storytelling. Both elements are covered in depth on the VFX Fundamentals program

E *VFX Robot*
» Animation Mentor
The Compositing Basics element of the course provides invaluable experience, as compositing has become the focus point of many studios and processes

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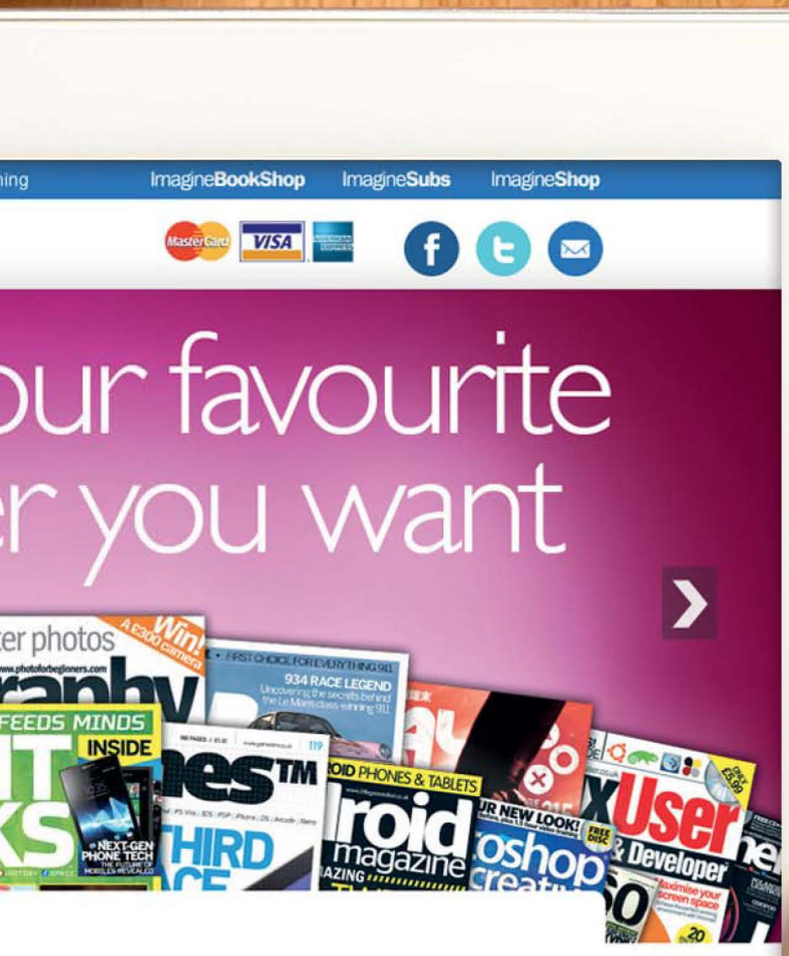

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